IEC 61850 Client Library

SIEMENS

USER MANUAL

IEC 61850 Client Basis Library

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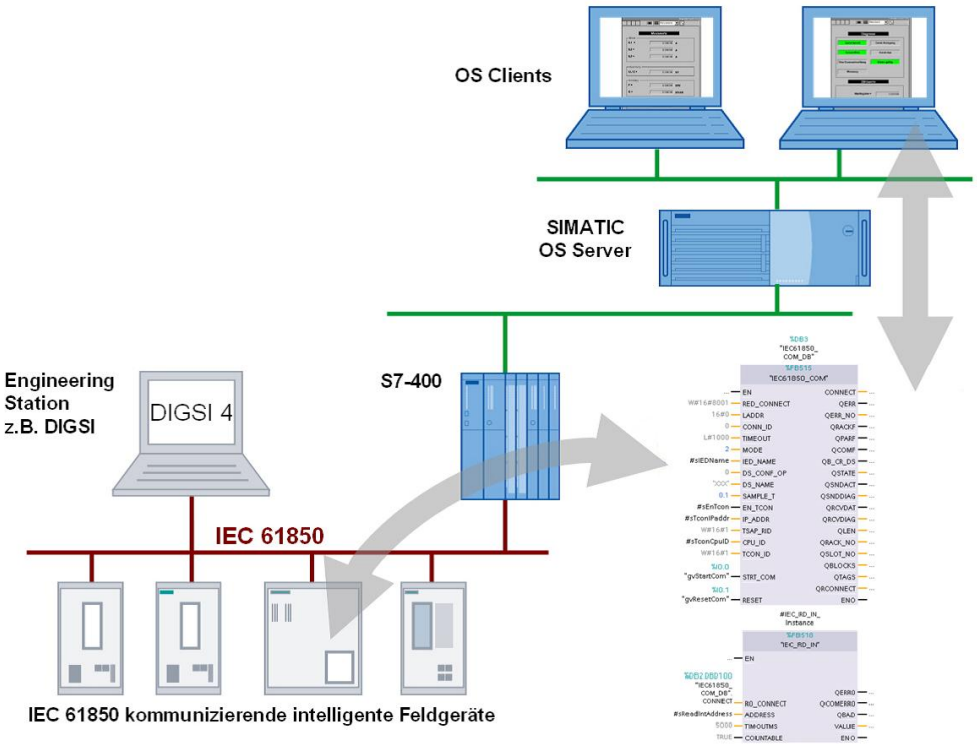

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1. Software-Requirements and Use Conditions

Software:

TIA Portal V12.1 / TIA Portal V13

IEC61850 device engineering tool

IEC Browser

Library:

The library for S7 300 systems is available in two different compilations.

- Lib_TIA_v1[21|3]_IEC61850_Client_300_CP
  Using the library with an additional CP module
- Lib_TIA_v1[21|3]_IEC61850_Client_300_TCON
  Using the library with the CPUs PN-IO port

See also chapter Simatic Manager – Net configuration

Hardware:

The following Hardware is supported with the IEC61850 block library. (The library therefore is available in two different compilations)

- S7 300 (Lib_TIA_v1[21|3]_IEC61850_Client_300_[CP|TCON])
- S7 400 (Lib_TIA_v1[21|3]_IEC61850_Client_400)
- S7 1500 (Lib_TIA_v1[21|3]_IEC61850_Client_1500)

For communication over Ethernet it is required to use either:

- CP 343-1EX11 V2.6 Ethernet CP (or higher) or S7 300, S7 CPU with PN-IO interface
- CP 443-1EX11 V2.6 Ethernet CP (or higher) or S7 400 CPU, mEC with PN-IO interface

Maximum instances per S7 400 CPU:

With the CP 443-1 as well as the CP 343-1 module up to 64 network connections can be created. Due to the fact, the S7 CPU handles the IEC 61850 protocol the IEC61850_COM block consumes a lot of scan time and memory. (The CP module handles only the deeper Layers ISO on TCP and TCP)
Therefore the IEC 61850 library is limited by up to 8 connections per CPU.

S7 300 CPU restrictions:

Alarm and reporting functionality is not supported by S7 300 CPU. Because of this, IEC_ALARM AND IEC_REP blocks are not delivered with S7 300 Lib (Lib_TIA_v1[21|3]_IEC61850_Client_300_[CP|TCON])).

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Generel performance restrictions:

The maximum number of IEC61850 tags, which can be handled by the library, depends on the used CPU and the number of connected IEC61850 server devices. To calculate the maximum number we provide an excel sheet you can download on our IEC61850 product web-page:

http://www.industry.siemens.com/industrysolutions/global/en/IT4Industry/products/simatic_add_ons/iec-meets-simatic/iec_client_library/Pages/Default.aspx

In order to use the blocks, a license for each plant/project is required.

Additional functionality can be implemented on request.

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2. Installation

2.1 TIA Portal – Open global library

The IEC 61850 Client library comes as global TIA Portal library with the file name Lib_TIA_v1[21|3]_IEC61850_Client_[3|4|15]00_[CP|TCON].al1[2|3].

The library has to be opened in the project view of TIA Portal. Open the library with option “Open as read-only” in open file dialog.

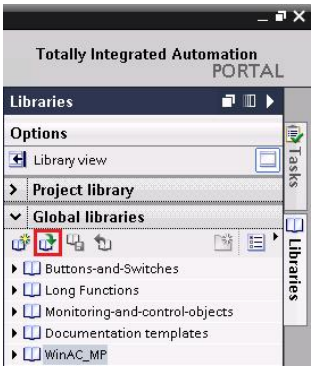

Figure 1 - Open library

After the library was opened you can find out all objects for using the library underneath the directory “Master copies”. This directory contains:

- An instruction profile for compiling the library (not S7-1500)
- The IEC61850 data types
- The IEC61850 symbols
- The IEC61850 program blocks

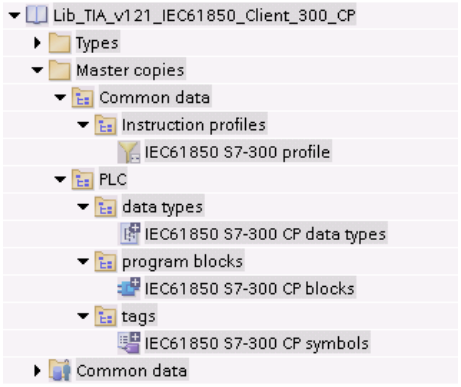

Figure 2 - Library structure

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Copy the libraries instruction profile to your project instruction profiles and activate it by context menu. Open the profile in editor and change the value in combo box “CPU family” to the type you are using.

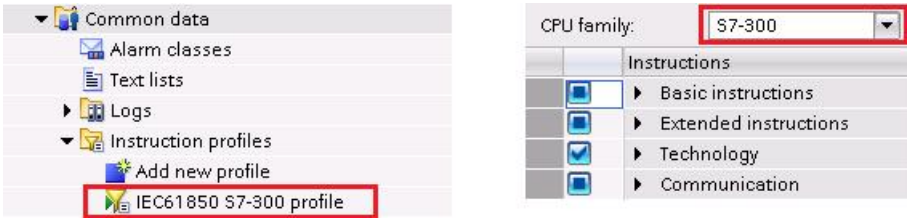

Figure 3 - Common instruction profiles

Copy the PLC elements from the library to your PLC object in the project which should use the IEC 61850 communication.

IEC61850 symbols → PLC tags

IEC61850 data types → PLC data types

IEC61850 program blocks → Program blocks

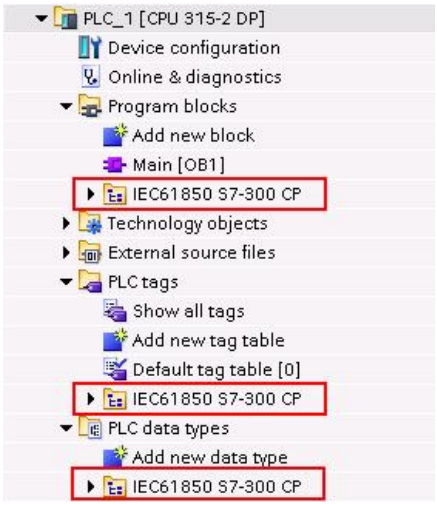

Figure 4 - PLC

Compile all your program blocks (Software (rebuild all blocks)).

After the compile action has finished, the following system blocks should be added to your PLC. The optional blocks will just be added when using T-communication library (Lib_TIA_v1[21|3]_IEC61850_Client_300_TCON).

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BLOCK NO	NAME	PLC-Type
FC 2	CONCAT	S7-300/S7-400
FC 5	AG_SEND	S7-300/S7-400
FC 6	AG_RECV	S7-300/S7-400
FC 10	EQ_STRING	S7-300/S7-400
FC 11	FIND	S7-300/S7-400
FC 21	LEN	S7-300/S7-400
FC 26	MID	S7-300/S7-400
FB 63	TSEND (opt.)	S7-300/S7-400
FB 64	TRCV (opt.)	S7-300/S7-400
FB 65	TCON (opt.)	S7-300/S7-400
FB 66	TDISCON (opt.)	S7-300/S7-400
FB 700	Program_Alarm	S7-1500
FB 1030	TSEND_C	S7-1500
FB 1031	TRCV_C	S7-1500

Table 1 – System blocks

Note: The IEC61850 library for S7-300/S7-400 PLC types contains function block “CreateCommunicationBlocks”. This function block has no functionality in IEC61850 communication. The function block is necessary when IEC61850 library is compiled for the first time. If the library is compiled it makes sure that system blocks FC5 and FC6 will be generated successful.

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2.2 TIA Portal – IEC 61850 Client Block setup

2.2.1 Setup a singular communication

- Add a new cyclic organization block (e.g. OB35) to your PLC
- Add a new Function Block (FB) to your PLC.
- Open the organization block in editor, drag the new FB into a network and add the instance data block to your program.

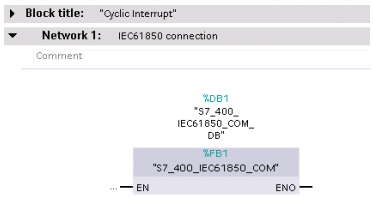

Figure 5 - Cyclic OB - Call FB

- Open the function block in editor.
- Select function block “IEC61850_COM” underneath the IEC61850 group directory in your PLC and drag it to a network in your function block.
- Add the instance data block to your program.

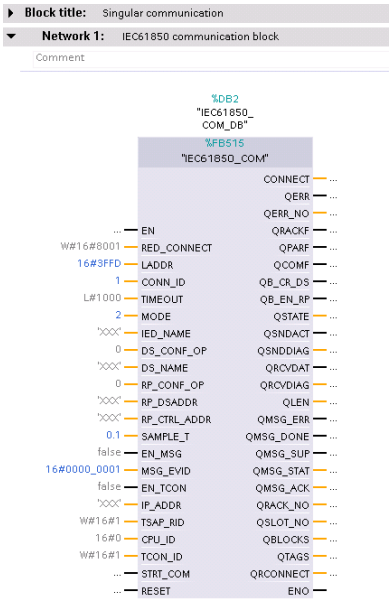

Figure 6 - IEC61850_COM block

- The IEC61850_COM block inputs and outputs are explained detailed in chapter Block description IEC61850_COM
- MODE:

  Here you can choose the mode for the cyclically reading of tags. It is important to choose the correct mode for your application.

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If your device supports DataSets, we recommend using this option, because it is the fastest way for communication.

The following configurations are possible:

<table>
<tr><th>Input name/ device properties</th><th colspan="2">DataSet supported</th><th>No DataSet supported</th></tr>
<tr><td rowspan="2"></td><td>Dynamic DataSets supported</td><td>Only static DataSets supported</td><td rowspan="2">Device does not support DataSets, use LIST mode, all connected Tag blocks are put together to one READ-request</td></tr>
<tr><td>Device allows dynamic creation of DataSets with IEC61850_COM block</td><td>DataSets can only be created with an external engineering tool</td></tr>
<tr><td>MODE</td><td>DATASET</td><td>DATASET</td><td>LIST</td></tr>
<tr><td>DS_CONF_OP</td><td>SUPPORTED</td><td>NOT SPTED</td><td>NOT SPTED</td></tr>
<tr><td>DS_NAME</td><td>DataSet name of your choice. Will be created in device automaticly by the library. Entering only a DataSet name will put the DataSet to the root directory (VMD specific area) e.g. “DataSet1”
Entering a DataSet name with Domain address will create the DataSet in the adequate directory (domain, item specific)
e.g. “CTRL/LLN0$$DataSet1”</td><td>Enter the DataSet name, which was previously configured with the external engineering tool.
e.g. “DataSet1” (if resides in VMD area) or
“CTRL/LLN0$$DataSet1”
Note: In this case, the configured tag blocks have to be engineered in the same order like specified in the previously configured DataSet.
Further: DataSet entries must not contain objects, but only attributes, except for ALARM tags.</td><td>-</td></tr>
</table>

Table 2 - DATASET configuration

- REPORTING: If your IEC61850 device supports Reporting, enter the DataSet address for reporting, containing the list of Report values, in the input RP_DSADDR. (e.g. “CTRL/LLN0$$DataSet2”). Only the complete address is allowed.

  Note: It is recommended to configure not the same DataSet you have configured on input DS_NAME for cyclically reading the tag blocks (e.g. IEC_RD_BO,

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IEC_RD_IN...). For reporting functionality you have to create a separate Data Set within your IEC61850 server device with the related IEC61850 device engineering tool. If your IEC61850 server device is a SIPROTEC, the DataSet for reporting is automatically installed by DIGSI with creating a new report application (see A.1.3).

Further enter the Report Control block address (e.g. "CTRL/LLNO$$BR$$brcbA01") at the input RP_CTRL_ADDR. This Control block should contain the previous configured DataSet name in the field DataSet after the communication has started. Please verify with IEC61850 Browser.

- Configure the Input IED_NAME with the IEC 61850 device name. (Please note, all addresses and names are Case sensitive)
- Set the cycle time of the OB which calls the communication block to SAMPLE_T. This input should never be 0.0. It's used for TIMOUT calculation.
- To enable WinCC messaging, set the EN_MSG to 1.
- TIMEOUT is the maximum wait time in milliseconds to wait for an answer after a READ request.
- Set STRT_COM input to "OFF", till the engineering work is done; to start communication, set it to "ON"
- Please follow up with adding at least one RD_XXX block. This procedure is explained in chapter 2.2.2 Configure Tag blocks

2.2.2 Configure Tag blocks

The IEC 61850 Client library is designed for a very flexible use. On one hand there is the IEC61850_COM block which handles the IEC61850 protocol block and management functionality. On the other hand there are several blocks which can be connected to the IEC61850_COM block, called tag blocks. Each of the tag blocks represents one value in a special data format (e.g. INT, REAL, BOOL)

Note: At least one IEC_RD_XXX block has to be connected to the IEC61850_COM block!

Currently the library supports the following tag blocks which read IEC61850 tags cyclically:

- IEC_RD_BO (BOOL)
- IEC_ALARM (BOOL with timestamp)
- IEC_RD_BS (BITSTRING)
- IEC_RD_IN (INT)
- IEC_RD_RL (REAL)

The following tag blocks read values on change with the IEC61850 reporting mechanism

- IEC_REPORT (BOOL on change with timestamp)

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Switches can be controlled with:

- IEC_CTRL (uses IEC61850 control mechanism)

Additionally tags can be written (e.g. substitution values) with the following blocks

- IEC_WR_BO (BOOL)
- IEC_WR_BS (BITSTRING)
- IEC_WR_IN (INT)
- IEC_WR_RL (REAL)

2.2.3 Engineer tag blocks

- Add e.g. one IEC_RD_IN block
- Set R0_CONNECT to the data block value IEC61850_COM_DB.CONNECT. For the following tag blocks always use the same order of R0_CONNECT!

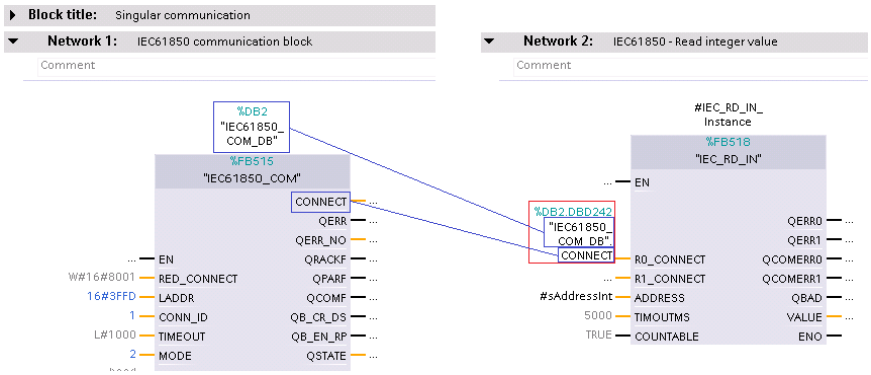

Figure 7 - Set R0_Connect to DB value “CONNECT”

- Enter the IEC61850 address string on input “ADDRESS”
  (Please note in Step 7 you have to replace “$” with “$$”)

  Note: These IEC61850 address strings can also be generated and copied via the StatCon configuration tool. For further information see Configuring IEC61850 addresses via StatCon.

  - For the simple tag blocks:
    - IEC_RD_BS (BITSTRING),
    - IEC_RD_IN (INT),
    - IEC_RD_RL (REAL)
    - IEC_RD_BO (BOOL)

    The full path including the object attribute has to be entered, starting with the IEC 61850 domain name.

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e.g. CTRL/LLN0$$ST$$Loc$$stVal (for a BOOL tag block)

- For the complex tag blocks:
  - IEC_ALARM (BOOL with timestamp),
  - IEC_REPORT (BOOL on change with timestamp)
  - IEC_CTRL (uses IEC61850 control mechanism)

  Only the path to the object name itself has to be entered

  e.g. CTRL/LLN0$$ST$$Loc (for a REPORT tag block).

  In Case of IEC_CTRL the path excluding Oper/SBO object has to be set up: e.g. CTRL/LLN0$$CO$$LEDRs

Figure 8 - Example: Tag block configuration

- Set up user defined WinCC messages. The tag blocks
  - IEC_ALARM (BOOL with timestamp),

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- IEC_REPORT (BOOL on change with timestamp)

can be configured to generate messages in WincC.

The message texts can be specified like described in the following:

- Open the PLC alarms in editor
- If you are using a single instance DB for your IEC_ALARM or IEC_REPORT block you can change the default text of the subalarm entries of MSG_EVID of the block. These text entries are used for each single instance DB of this block.
- If you are using a multi instance DB for your IEC_ALARM or IEC_REPORT block no default alarm texts will be used. You have to declare the alarm texts for each multi instance DB.
- After changing the message texts, the AS program and the OS should be compiled. The compiled AS program has to be downloaded to the CPU.

Please note:

- At least one cyclically read tag block (IEC_RD_XXX) has to be engineered to establish the communication to an IEC 61850 device
- At maximum up to 80 cyclically read tag blocks can be configured. The maximum size of connected blocks is 250. The more blocks are engineered, the more CPU scan time is needed. Detailed performance information you can find here: 1 Software-Requirements and Use Conditions

2.3 TIA Portal – Net Configuration (not S7-1500)

Like mentioned in the introduction, the IEC61850 client library can be used with an additional CP module or with the CPUs PN-IO port (if available at the CPU)

The SIEMENS SIMATIC environment offers two different system libraries for network communication:

- AG_(L)SEND/AG_(L)_RCV (communication parameters are set up in the network view of TIA Portal. Connection reference parameters have to be taken out from the network view and set to the IEC61850_COM block)
- T-communication library (all communication parameters, like IP address, type, are engineered directly on the IEC61850_COM block, no configuration in network view is necessary!

Communication via the CP 443-1 /CP343-1 module can be done with the AG_(L)SEND/AG_(L)RECV communication. Therefore follow up with chapter 2.3.1 Using network view configuring AG_(L)SEND/AG_(L)RECV

Communication via the PN-IO port requires communication with the T-communication blocks. If you want to connect an IEC 61850 device with your CPUs PN-IO port follow up with chapter 2.3.2 Using program block configuring T-communication settings .

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2.3.1 Using network view configuring AG_(L)SEND/AG_(L)RECV

The network view allows configuring the Ethernet connection between the CP443-1 Communication Processor and an active communication partner (IEC 61850 client).

- Navigate to the dedicated S7 PLC in project tree view.
- Open the device configuration editor and switch to network view.
- Choose option “Connections” on toolbar and entry “ISO-on-TCP connection” in combo box.

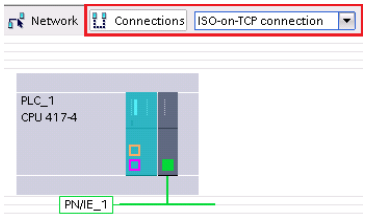

Figure 9 - Network view settings

- Select PLC object in network view, open its context menu and choose entry “Add connection”.

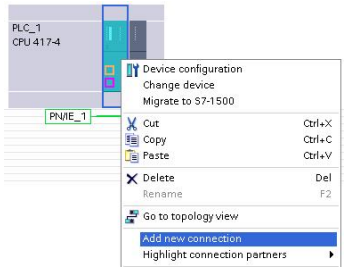

Figure 10 - Add new connection

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- To create a new connection press button “Add” on dialog “Create new connection” and close the dialog on “Close” button. The new connection was added to the connection table on tab “Connections”.
- Select the new connection and choose tab “Properties”.

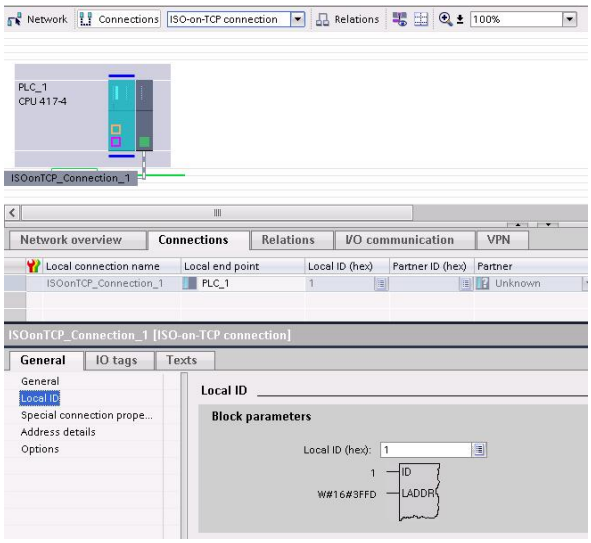

Figure 11 - The new ISO on TCP connection

- Choose general entry “Special connection properties” and make sure, “Active connection establishment” is selected (active).

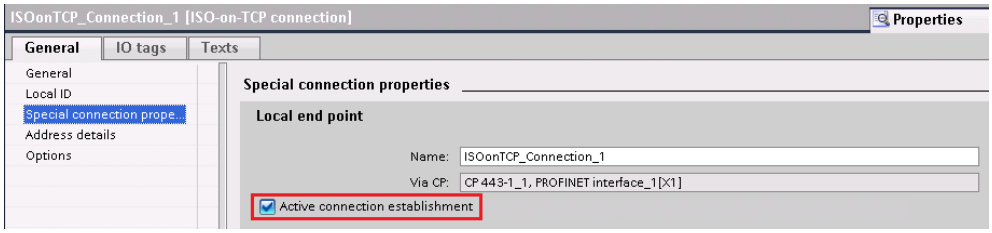

Figure 12 - Properties - ISO-on-TCP connection: Special connection properties

- Choose “Local ID” and note down the Block Parameters “ID” and “LADDR”. These parameters are used later for the IEC61850 Server block inputs “CON_ID” and “LADDR” as connection reference.

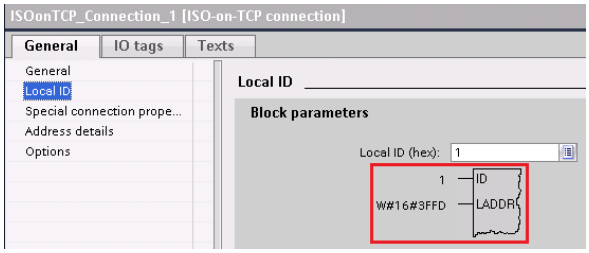

Figure 13 - Properties - ISO-on-TCP connection: Local ID

- Navigate to “Address details” and enter the Local TSAP and Remote TSAP. These parameters should be taken out from your IEC 61850 device description. (default setting is: Local TSAP 00.01 and Remote TSAP 00.01)

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- Enter the IEC 61850 device IP address.

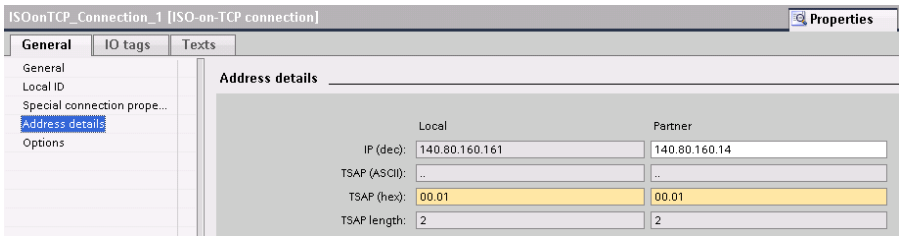

Figure 14 - Properties - ISO-on-TCP connection: Address details

- Compile and download changed communication parameters

Now you can use the following IEC61850_COM inputs in your program block:

Input name	description
EN_TCON	This Input should be set to “0” disabling T-communication and enabling AG_(L)SEND/AG_(L)RECV
LADDR	Enter the LADDR connection reference parameter from network view
CONN_ID	Enter the Connection ID reference parameter from network view

Table 3 - AG_(L)SEND/AG_(L)RECV parameter settings

2.3.2 Using program block configuring T-communication settings

The following Input parameters have to be setup for the IEC61850_COM block, using singular communication.

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Input name	Description	PLC type
EN_TCON	This Input should be set to “1” enabling T-communication and disabling AG_(L)SEND/AG_(L)RECV	S7-300/S7-400/S7-1500
IP_ADDR	Enter the IEC61850 server IP address (protection relay)	S7-300/S7-400/S7-1500
TSAP_RID	Enter the IEC61850 server TSAP number (default no: 0001)	S7-300/S7-400/S7-1500
CPU_ID	Select the communication port. Enter the CPU type, if you use the CPUs PN-IO port. Select WinAC, if you use a modular Embedded Controller. Select CP443, if you want to run T-CON communication explicit with an CP 443-1 module	S7-300/S7-400
TCON_ID	TCON_ID has to be unique for every IEC61850 communication instance running on a S7 CPU. We recommend subsequent numbering for every instance starting with “1”.	S7-300/S7-400
Interface_ID	Hardware identifier of the local interface. Find out this ID in properties of your communication module.	S7-1500
CON_ID	CON_ID has to be unique for every IEC61850 communication instance running on a S7 CPU. We recommend subsequent numbering for every instance starting with “1”.	S7-1500

Table 4 – T-communication parameter settings

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4		Static					
5		sComIedName	String[24]	0.0	'IED_0002'	☑	☐
6		sComEnMsg	Bool	26.0	true	☑	☐
7		sComEnTcon	Bool	26.1	true	☑	☐
8		sComIPaddr	String[15]	28.0	'140.80.160.14'	☑	☐
9		sComCpuID	Byte	45.0	5	☑	☐
10		IEC_RD_IN_Instance	"IEC_RD_IN"	46.0		☑	☐
11		sRdInAddress	String[52]	398.0	'CTRL/LLN0$$ST...	☑	☐

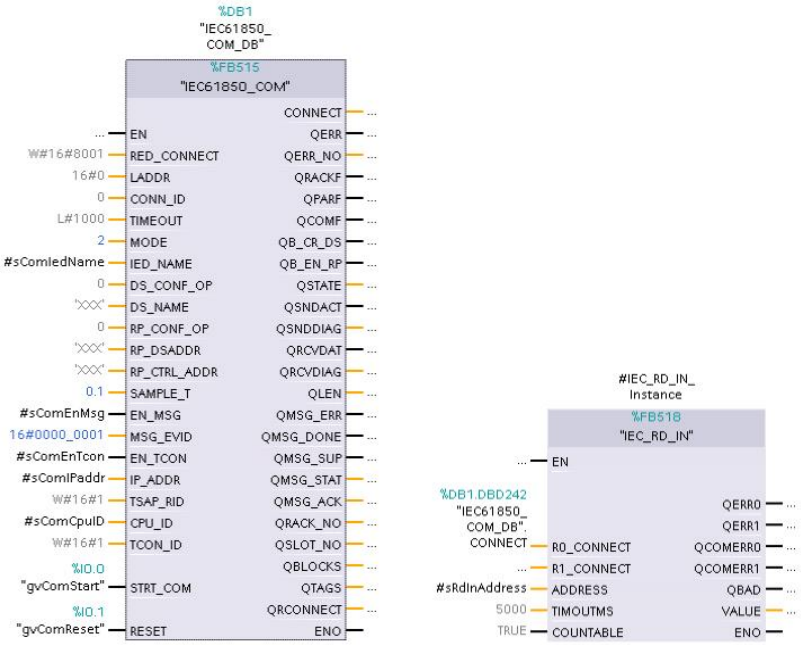

Figure 15 - T-communication example S7-300/S7-400

7		Static		
8		sIedName	String[24]	'IED_0002'
9		sEnMsg	Bool	true
10		sEnTCON	Bool	true
11		sIPAddr	String[15]	'140.80.160.14'
12		sInterfaceID	HW_ANY	262

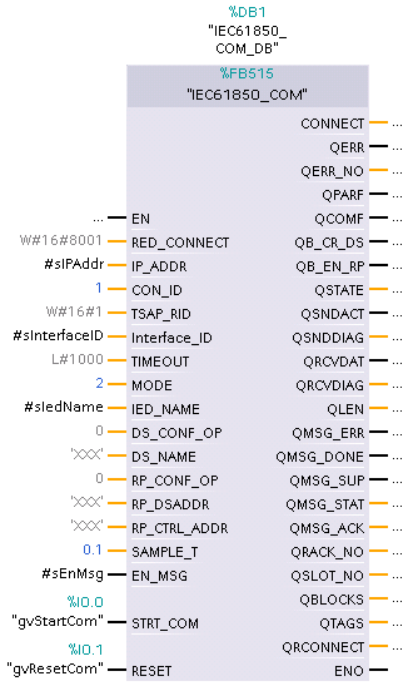

Figure 16 - Communication Example S7-1500

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2.4 Configuring IEC 61850 addresses via StatCon

The delivery of the IEC61850 Client Basic Library contains also the StatCon configuration tool. This tool can be used for configuring the correct IEC61850 addresses on the tag blocks in your TIA Portal program.

2.4.1 Copy and paste IEC61850 addresses

This chapter explains how addresses can be copied from StatCon to your blocks in TIA Portal program. For further information's about working with the configuration tool, please refer to the separated StatCon manual.

The first step is to add a new "IEC61850 Client Basic Library" Station device and a new "External device" in StatCon.

After this, you have to assign the ICD file of your IEC device to the external device. If the settings of the external device were applied the data structure of your IEC device will be generated.

Drag the Data Objects of the IEC device, you want to configure, to the tag table of the "IEC61850 Client Basic Library" Station device. In the tag table a new entry is added which contains the IEC61850 address of your Data Object with the correct object separators as required on tag blocks of the IEC61850 library in TIA Portal.

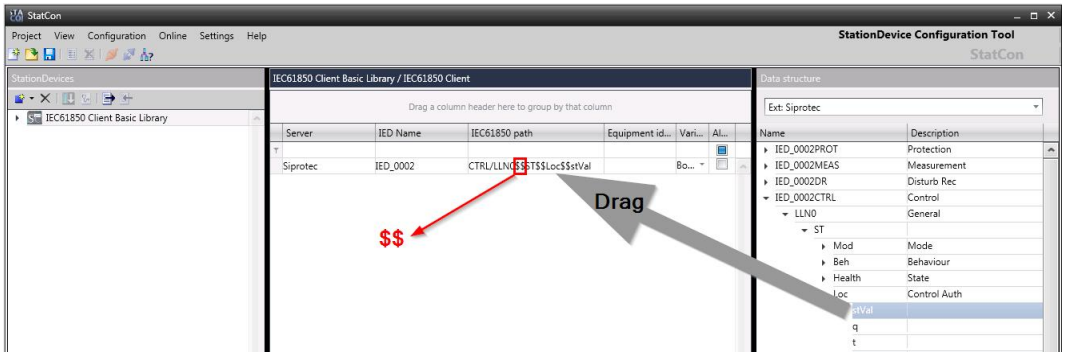

Figure 17 - Drag Data Object to tag table

With the checkbox in table column "Alarm/Report" you can select if the address is used on a tag block or on an alarm or report block. If you want to use the address on an alarm or report block, activate the checkbox. After this, the address did not contain the address part of the IEC61850 Data Attribute name anymore.

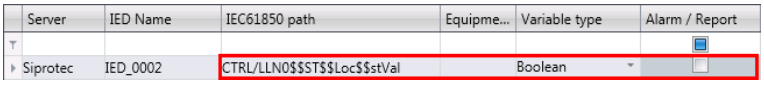

Figure 18 - Address for tag block

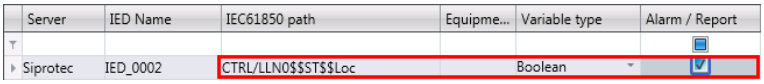

Figure 19 - Address for alarm or report block

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To copy the IEC61850 address, open the context of the corresponding tag by a right click on mouse and select context entry “Copy address to clipboard”.

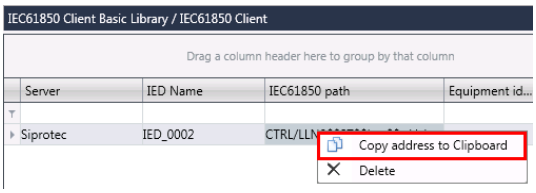

Figure 20 - Copy address form StatCon tag

After this, switch to your TIA Portal program block and paste address value.

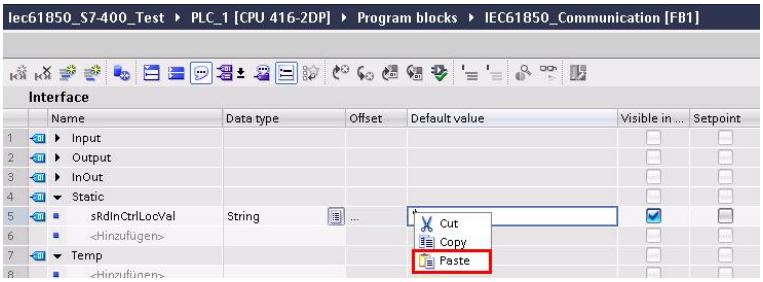

Figure 21 – Paste address to TIA Portal program block

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3. Block description

3.1 IEC61850_COM

3.1.1 Block screenshot

5	sComIedName	String[24]	...	'IED_0002'
6	sRepConfOp	Int	...	1
7	sRepDataSetAddress	String[52]	...	'CTRL/LLN0$$DataSet2'
8	sRepCtrlAddress	String[52]	...	'CTRL/LLN0$$BR$$brcbA01'
9	sEnMsg	Bool	...	true

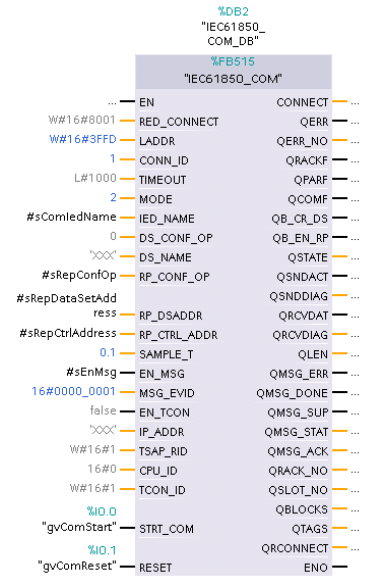

Figure 22 - screenshot IEC61850_COM block S7-300/S7-400

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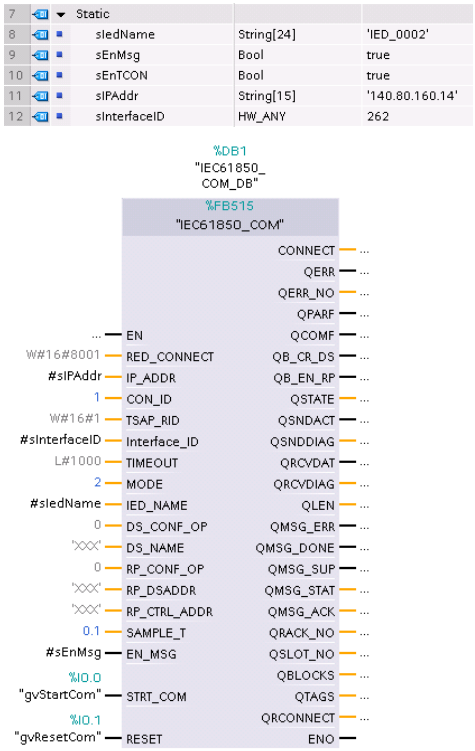

Figure 23 - screenshot IEC61850_COM block S7-1500

3.1.2 Block description

IEC61850_COM block handles the IEC 61850 protocol. It manages all connected tag blocks. It recognizes cyclic read tags, creates read requests and dispatches the values to the connected blocks. Furthermore Reports are dispatched to the dedicated blocks.

In the following the most important inputs and outputs will be explained detailed

RED_CONNECT
Do not change default value of this input (default value 16#8001). This input is just necessary for H-systems and these systems will not be supported by TIA Portal.

LADDR / CONN_ID
LADDR input and CONN_ID specify the used NetPro connection between the CP 443-1 CP and the IEC 61850 device, when using AG_(L)SEND/AG_(L)RECV communication.

CONN_ID
LADDR input and CONN_ID specify the used NetPro connection between the CP 443-1 CP and the IEC 61850 device, when using AG_(L)SEND/AG_(L)RECV communication.

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MODE
Mode input configures the way the IEC61850_COM block requests the cyclically read values:

DEBUG_MODE (0) means, the IEC_61850_COM block is running in debug mode. It sends a read request for every tag, which should be read cyclically and evaluates its response. In that mode it can be verified, if an IEC61850 tag address is not set up correctly. (QBAD = TRUE). This mode is only for debugging.
Caution: This mode does not support IEC_CTRL, IEC_REPORT. Although the tags blocks can be connected to the IEC61850_COM block, they will not work properly

DATASET (1) stands for DataSet mode. This means, at beginning a list (DataSet) is created in the IEC 61850 device. When running in ZYKLCOM, all variables are read with requesting the list name. Not all devices support the services to create a DataSet dynamically over the IEC61850 protocol, but allow configuring a DataSet with a Engineering Tool. Therefore it is important to know the existing DataSet with the containing tags. This can be done accessing the device with the IEC61850 browser. DS_CONF_OP can be set to “NOT_SPTED” and the connected tag block schedule order should correspond to the order in the DataSet existing in the device.

LIST (2) mode reads all the connected tags within one request. Therefore a list of tags containing all addresses is read cyclically. This mode is very scan time consuming. It should only used for devices, which not support DataSets.
May be the TIMEOUT variable has to be increased. This is indicated, if IEC61850_COM block reaches “ZYKLCOM” state but does not keep it stable.

It is recommended to set MODE to DATASET, due to the fact it is the fastest way to poll tags cyclically. If your IEC 61850 device does not support datasets, use LIST mode.

DEBUG mode should only used to detect address configuration faults.

LIST mode as well as DATASET mode require a RESET for engineering changes (add, delete blocks, address change)

Please see also table DATASET configuration

IED_NAME
The IED name has to be set with this input (IED: Intelligent Electronic Device). The IED name is a string and is set up with your engineering tool. (e.g. IED_001c).

It can be read out with the IEC 61850 browser tool.

DS_CONF_OP
DS_CONF_OP stands for DataSet Configuration Operations. These can either be supported or be not supported. (dynamic create, delete DataSets). Check your device description if these operations are supported

DS_NAME
The DataSet name is a string to identify your DataSet to cyclically read tags. The DataSet

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is placed in the IEC61850 device VMD area (entering only the DataSet name like “DS1” or in the Device Domain/Item area, like “CTRL/LLN0$$DS1”.

RP_CONF_OP

RP_CONF_OP stands for Reporting Configuration Operation. If the IEC 61850 device supports subscribing and unsubscribing Reports select “SUPPORTED”, otherwise select “NOT_SPTED”.
If subscribing to reports is selected, the IEC61850_COM block enables the buffered Reporting for all tags included in the DataSet specified with RP_DSADDR (whole address) with the trigger “on change”. Therefore a free Report Control block address which contains the RP_DSADDR in entry DataSet has to be specified in RP_CTRL_ADDR.

If RP_CONF_OP is set to “SUPPORTED”, each installed report block (IEC_REP) will be initialized during communication startup with the values of the connected IEC61850-Server device. After initialization, report values will only be changed if a report is triggered through a connected IEC61850-Server device.

RP_DSADDR
pecify the DataSet containing the tags for reporting. The whole DataSet address has to be configured. E.g. 'CTRL/LLN0$$DataSet1'

RP_CTRL_ADDR

Specify a free Report Control block address to enable reporting. Normally the corresponding Report Control blocks reside in the same tree part like the Report DataSet.

e.g. 'CTRL/LLN0$$BR$$brcbA01'

EN_TCON

This Input should be set to “1” enabling T-communication and disabling AG_(L)SEND/AG_(L)RECV

IP_ADDR
Enter the IEC61850 server IP address (protection relay), when using T- communication.

TSAP_RID
Enter the IEC61850 server TSAP number (default no: 0001), when using T- communication.

CPU_ID
Select the communication port. Enter the CPU type, if you use the CPUs PN-IO port. Select WinAC, if you use a modular Embedded Controller. Select CP443, if you want to run T-CON communication explicit with a CP 443-1 module. Configuration is only necessary if T- communication is used.

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Interface_ID
Hardware identifier of the local interface. Find out this ID in properties of your communication module.

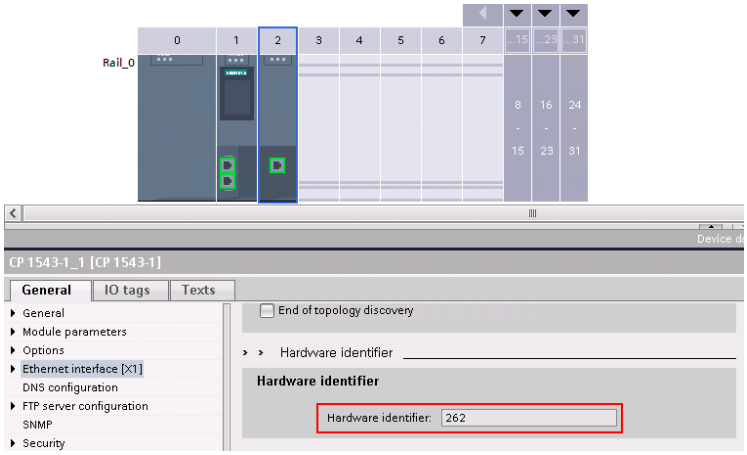

Figure 24 - Example for an interface ID of a CP module

TCON_ID/CON_ID
TCON_ID has to be unique for every IEC61850 communication instance running on a S7 CPU. We recommend subsequent numbering for every instance starting with “1”. Configuration is only necessary if T- communication is used.

SAMPLE_T
CFC uses SAMPLE_T to write the block OB cycle time in ms/100. This input should never be 0.0. It is used for TIMOUT calculation.

EN_MSG
Enables WinCC messaging, if set to “1”

STRT_COM
OFF deactivates the communication via IEC61850. ON starts the communication again.

RESET

Reset deactivates the IEC61850 communication, set all internal variables to INIT value and re-organizes the internal block list. It has to be excecuted, if for example a tag block is removed or added or a address has changed.

CONNECT
CONECT output has to be connected with the tag block R0/1_CONNECT input. (singular mode: connect only R0_CONNECT, redundant mode: connect R0_CONNECT, when IEC61850_COM is connected with CP Rack 0, otherwise connect R1_CONNECT)

QERR
QERR is set to “1” if any error occurs.

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QERR_NO
QERR_NO delivers detailed error information. (Not yet supported)

QRACKF
QRACKF is set to “1”, if a RACK failure occurs

QPARF
QPARF is set to “1”, if plausibility check of connection parameters LADDR and CONN_ID failed

QCOMF
QCOMF is set to “1”, in case of IEC61850 communication is not in state “ZYKLCOM”. Communication error.

QB_CR_DS
If QB_CR_DS is set to “1” the DataSet with the name specified in DS_NAME could not be created.

QB_EN_RP

IF QB_EN_RP is set to “1” writing the Report configuration failed. Reporting could not be enabled.

Caution: if QB_EN_RP is set to “1”, all connected IEC_REPORT blocks will not work properly

QSTATE
IEC 61850_COM is mainly organized with a state machine. QSTATE shows the current state. If communication to the IEC 61850 device is established correctly, the function block is running in state “ZYKLCOM” after initialization.

The following table lists the possible states

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QSTATE	PROG_STATE	Description
0	'INIT'	Initialization state to get parameter
1	'CONREQ'	Send initiate request
2	'CONRES'	Receive initiate response
3	'CONERROR'	Connection error (please see table on next page)
4	'CDSEXREQ'	Send Request to check existence of DataSet
5	'CDSEXRES'	Receive Response for DataSet existence request
6	'CDSCRREQ'	Create DataSet request
7	'CDSCRRES'	Create Dataset response
8	'CDSDLREQ'	Delete DataSet request
9	'CDSDLRES'	Delete DataSet response
10	'CINFOREQ'	Write ReportCtrlblock request
11	'CINFORES'	Write ReportCtrlblock response
12	'ZYKLCOM'	Cyclic communication state.
13	'CONCLREQ'	Conclude Request
14	'CONCLRES'	Conclude Response
15	'FINREQ'	Release Request
16	'FINRES'	Release Response
17	'ABORT'	Abort received

Table 5 – IEC61850_COM QSTATE output

QRCONNECT
If running in redundant mode, this output has to be connected with the IEC61850_RED RCONNECT0/1 input

3.1.3 Called blocks

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Declaration/Block number	Declaration/Block name
FB511	MMS_BuildReq
FB512	MMS_ParseResp
FB513	IEC61850CLPgrLgc
FB514	IEC61850_Link
FB529	MMS_ParseDSAddr
FB531	MMS_Strin_IP_Konv
FB63	TSEND
FB64	TRCV
FB65	TCON
FB66	TDISCON
UDT10	BST_BOOL_SHORT
UDT11	BST_INT_SHORT
UDT12	BST_REAL_SHORT
UDT13	BST_CTRL_SHORT
UDT14	IEC61850_Params
UDT16	BSt_BSTR_SHORT
UDT65	TCON_PAR
UDT7	BST_SHORT
UDT8	LINK_INFO
SFB35	ALARM_8P
FC21	LEN
FC50/FC5	AG_LSEND/AG_SEND
FC60/FC6	AG_LRECV/AG_RECV
SFC20	BLKMOV
SFC49	LGC_GADR
SFC6	RD_SINFO

Table 6 - IEC61850_COM called blocks

3.1.4 I/O description

Depending on used library, not all inputs and outputs in list will still require. So these inputs and outputs didn´t exists on the block.

These inputs and outputs are marked in list with the extension (opt.).

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I/O	I/O Name	Type	I/O De-fault	Comment
I	RED_CONNECT	WORD	16#8001	Connection to IEC61850_RED block
I	LADDR	INT	0	Logical CP I/O address
I	CONN_ID	INT	0	connection ID
I	TIMEOUT	DINT	1000	Timeout in milliseconds
I	MODE	INT	0	Debug mode (0) / DATASET (1) / LIST (2)
I	IED_NAME	STRING	XXX	IEC61850 IED name
I	DS_CONF_OP	INT	0	DataSet Configuration Operation SUP-PORTED / NOT SUPPORTED
I	DS_NAME	STRING	XXX	IEC61850 Dataset name
I	RP_CON_OP(opt.)	INT	0	Report Configuration Operation SUPPORT-ED / NOT SUPPORTED
I	RP_DSADDR(opt.)	STRING	XXX	DataSet address used for Reporting
I	RP_CTRL_ADDR(opt.)	STRING	XXX	DataSet Control block address
I	MSG_EVID(opt.)	DWORD	2	Alarm_8P message ID // depreciated
I	SAMPLE_T	REAL		Sample time input (system input)
I	EN_MSG(opt.)	BOOL	0	1 = enable alarm
I	MSG_EVID(opt.)	BOOL	0	System input for Alarming
I	EN_TCON(opt.)	BOOL	0	1=T-communicatoin, 0=AG_SEND/AG_RECV
I	IP_ADDR(opt.)	STRING	0	IEC61850 device IP address
I	TSAP_RID(opt.)	WORD	0	TSAP remote ID for T-communication
I	CPU_ID(opt.)	BYTE	0	Select correct CPU/CP for T-communication
I	TCON_ID(opt.)	WORD	0	Use unique number for T-communication instance
IO	STRT_COM	BOOL	0	1 = start communication
IO	RESET	BOOL	0	1 = reset function block
O	CONNECT	BOOL	1	Connection to input R_CONNECT of READ_IEC blocks
O	QERR	BOOL	0	General error
O	QERR_NO	WORD	0	Error number – not yet supported
O	QRACKF	BOOL	0	1 = Rack failure (power fault, CPU error, ...)
O	QPARF	BOOL	0	1 = Parameter assignment error module

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I/O	I/O Name	Type	I/O De-fault	Comment
O	QCOMF	BOOL	0	1 = Communication error, Communication not running in ZYKLCOM.
O	QB_CR_DS	BOOL	1	Create DataSet failed
O	QB_EN_RP(opt.)	BOOL	1	Subscribing Report failed
O	QSTATE	INT	0	Internal state
O	QSNDACT	BOOL	0	1 = data sent
O	QSNDDIAG	WORD	0	Detailed send status
O	QRCVDAT	BOOL	0	1 = data received
O	QRCVDIAG	WORD	0	Detailed receive status
O	QLEN	INT	0	Length of received data
O	QMSG_ERR(opt.)	BOOL	0	1 = ALARM_8P Error
O	QMSG_SUP(opt.)	BOOL	0	1 = Message suppression active
O	MSG_STAT(opt.)	WORD	0	ALARM_8P: STATUS Output
O	MSG_ACK(opt.)	WORD	0	ALARM_8P: ACKNOWLEDGE Output
O	QRACK_NO	INT	0	CP Rack-Number
O	QSLOT_NO	INT	0	CP Slot-Number
O	QBLOCKS	INT	0	Number of connected blocks
O	QTAGS	INT	0	Number of connected tags
O	QRCONNECT	WORD	16#00	Red. Communication output

Table 7 - IEC61850 I/O description

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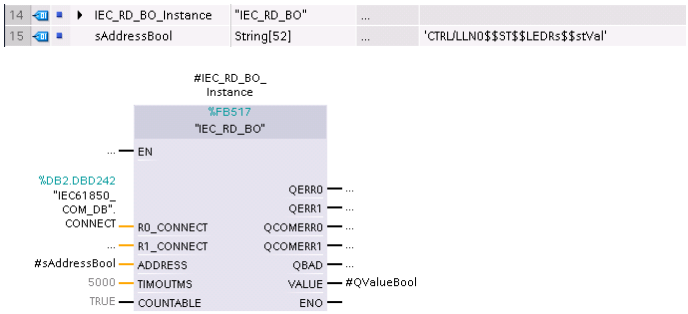
3.2 IEC_RD_BO (BOOL tag)

3.2.1 Block screenshot



Picture 1 - IEC_RD_BO screenshot

3.2.2 Block description

IEC_RD_BO reads one Boolean tag cyclically.

R0/1_CONNECT

R0_CONNECT input has to be connected to the IEC61850_COM block CONNECT output.

ADDRESS

The address for the tag has to be configured with the input ADDRESS. The address has to be entered as IEC61850 address string including the IEC61850 objects attribute name. (Note: The additional character “$” has to replaced with “$$” in STEP 7).

Note: The IEC61850 address strings can also be generated and copied via the StatCon configuration tool.

The function block outputs can be connected with other SIMATIC S7 blocks.

Example for address:

“CTRL/LLN0$$ST$$LEDRs$$stVal”

TIMOUTMS

TIMOUTMS specifies the time in ms the quality gets bad, if there is no actualization of the value.

QERR0

QERR0 is set, if the CFC connection to the IEC61850_COM block can not be found or is faulty.

QCOMERR0

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QCOMERR0 is set, if the IEC 61850 communication the IEC61850_COM handles is not working properly. IEC61850_COM: QSTATE != ZYKLCOM

QBAD

QBAD is set, if the value is not valid anymore.

Possible reasons are:

- No connection to any IEC61850_COM block
- No IEC 61850 communication running
- Address string not set properly, value was not updated for time TIMOUTMS

VALUE

VALUE represents the actual BOOL value addressed through IEC61850_COM IED_NAME and IEC_RD_BO ADDRESS string.

3.2.3 Called blocks

Declaration/Block number	Declaration/Block name
UDT3	BST_BOOL
UDT8	LINK_INFO
FC10	LEN
FC21	LEN
SFC64	TIME_TCK

Table 8 - IEC_RD_BO called blocks

3.2.4 I/O description

I/O	I/O Name	Type	I/O Default	Comment
I	R0_CONNECT	ANY(Struct)		Connection to IEC61850_COM block DB
I	ADDRESS	STRING[52]		IEC61850 tag address
I	TIMEOUTS	INT	5000	Timeout in ms
I	COUNTABLE	BOOL	1	Internal value
O	QERR0	BOOL	1	1 = Connection to IEC61850_COM block 0 faulty

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I/O	I/O Name	Type	I/O De-fault	Comment
O	QCOMERR0	BOOL	1	Communication IEC61850_COM block 0 not ok
O	QBAD	BOOL	1	0 = Data valid
O	VALUE	BOOL	0	Addressed value as BOOL

Table 9- IEC_RD_BO I/O description

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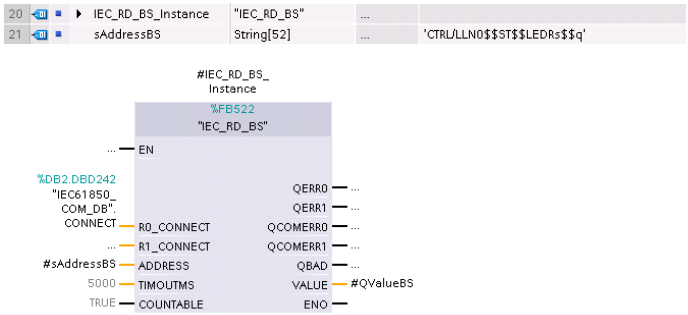
3.3 IEC_RD_BS (BITSTRING tag)

3.3.1 Block screenshot



Picture 2 - IEC_RD_BS screenshot

3.3.2 Block description

IEC_RD_BS reads one Bitstring tag cyclically.
The Bitstring length is limited by of 4 Bytes. Bitstrings with a length bigger than 4 bytes cannot be parsed.

Input/Output description is equal to IEC_RD_BO Block description. Please see chapter 3.3.2 Block description

3.3.3 Called blocks

Declaration/Block number	Declaration/Block name
UDT15	BST_BSTR
UDT8	LINK_INFO
FC10	EQ_sTRING
FC21	LEN
SFC20	BLKMOV
SFC64	TIME_TCK

Table 10 - IEC_RD_BS called blocks

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3.3.4 I/O description

I/O	I/O Name	Type	I/O Default	Comment
I	R0_CONNECT	ANY(Struct)		Connection to IEC61850_COM block DB
I	ADDRESS	STRING[52]		IEC61850 tag address
I	TIMEOUTS	INT	5000	Timeout in ms
I	COUNTABLE	BOOL	1	Internal value
O	QERR0	BOOL	1	1 = Connection to IEC61850_COM block 0 faulty
O	QCOMERR0	BOOL	1	Communication IEC61850_COM block 0 not ok
O	QBAD	BOOL	1	0 = Data valid
O	VALUE	DWORD	0	Addressed value as BITSTRING

Table 11- IEC_RD_BS I/O description

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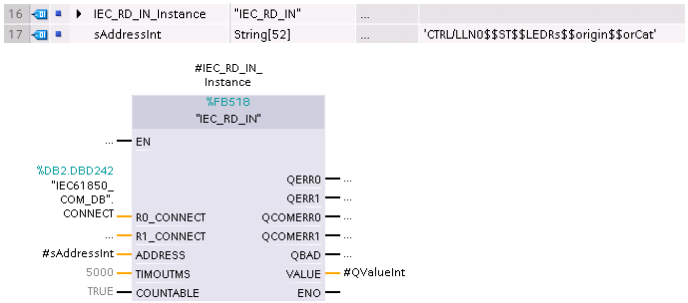
3.4 IEC_RD_IN (INTEGER tag)

3.4.1 Block screenshot



Picture 3 - IEC_RD_IN screenshot

3.4.2 Block description

IEC_RD_IN reads one DINT tag cyclically. The Integer size is 32 bit (4byte).

Input/Output description is equal to IEC_RD_BO Block description. Please see chapter 3.3.2 Block description

3.4.3 Called blocks

Declaration/Block number	Declaration/Block name
UDT4	BST_INT
UDT8	LINK_INFO
FC10	EQ_STRING
FC21	LEN
SFC20	BLKMOV
SFC64	TIME_TCK

Table 12 - IEC_RD_BS called blocks

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3.4.4 I/O description

I/O	I/O Name	Type	I/O Default	Comment
I	R0_CONNECT	ANY(Struct)		Connection to IEC61850_COM block DB
I	ADDRESS	STRING[52]		IEC61850 tag address
I	TIMEOUTS	INT	5000	Timeout in ms
I	COUNTABLE	BOOL	1	Internal value
O	QERR0	BOOL	1	1 = Connection to IEC61850_COM block 0 faulty
O	QCOMERR0	BOOL	1	Communication IEC61850_COM block 0 not ok
O	QBAD	BOOL	1	0 = Data valid
O	VALUE	DINT	0	Addressed value as Integer (DINT)

Table 13- IEC_RD_IN I/O description

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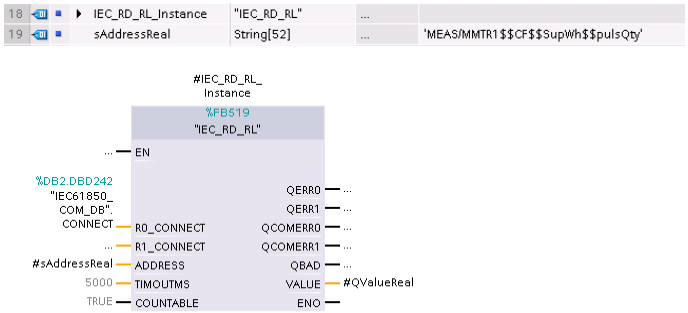
3.5 IEC_RD_RL (REAL tag)

3.5.1 Block screenshot



Picture 4 - IEC_RD_RL screenshot

3.5.2 Block description

IEC_RD_RL reads one REAL tag cyclically. The Floating point value size is 32 bit (4byte).

Input/Output description is equal to IEC_RD_BO Block description. Please see chapter 3.3.2 Block description

3.5.3 Called blocks

Declaration/Block number	Declaration/Block name
UDT5	BST_REAL
UDT8	LINK_INFO
FC10	EQ_STRING
FC21	LEN
SFC20	BLKMOV
SFC64	TIME_TCK

Table 14 - IEC_RD_RL called blocks

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3.5.4 I/O description

I/O	I/O Name	Type	I/O Default	Comment
I	R0_CONNECT	ANY(Struct)		Connection to IEC61850_COM block DB
I	ADDRESS	STRING[52]		IEC61850 tag address
I	TIMEOUTS	INT	5000	Timeout in ms
I	COUNTABLE	BOOL	1	Internal value
O	QERR0	BOOL	1	1 = Connection to IEC61850_COM block 0 faulty
O	QCOMERR0	BOOL	1	Communication IEC61850_COM block 0 not ok
O	QBAD	BOOL	1	0 = Data valid
O	VALUE	REAL	0	Addressed value as Floating point value (REAL)

Table 15- IEC_RD_RL I/O description

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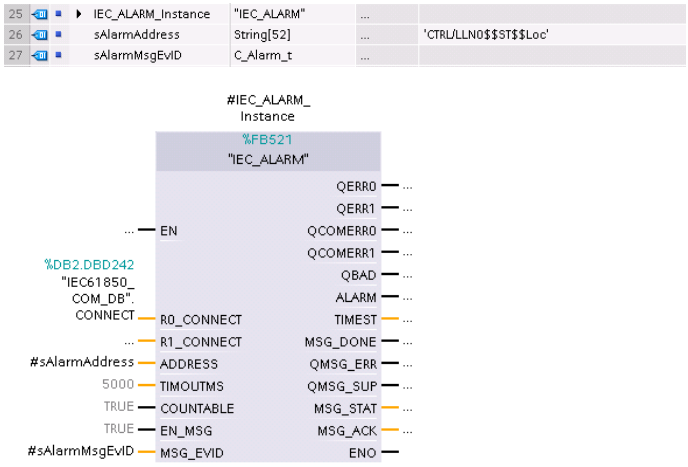
3.6 IEC_ALARM (BOOL tag with timestamp)

3.6.1 Block screenshot



Picture 5 - IEC_ALARM screenshot

3.6.2 Block description

IEC_ALARM reads one BOOL value cyclically with its timestamp which is updated, if the variable changes.

This block is not supported by S7-300 CPUs.

Note: The address has to be set without the IEC 61850 objects attribute name, only the IEC 61850 object name has to be set.

Note: The IEC61850 address strings can also be generated and copied via the StatCon configuration tool.

Example for address:

“CTRL/LLN0$$ST$$LEDRs”

EN_MSG
EN_MSG enables Alarming in WinCC. Special messages can be specified. Please see chapter 2.3.3 Set up user defined WinCC messages for a explanation on how do setup individual WinCC messages for a function block.

Further Input/Output description is equal to IEC_RD_BO Block description. Please see chapter 3.3.2 Block description

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3.6.3 Called blocks

Declaration/Block number	Declaration/Block name
FB530	UTCcalc
SFB35	ALARM_8P
UDT3	BST_BOOL
UDT8	LINK_INFO
FC10	EQ_STRING
FC21	LEN
SFC20	BLKMOV
SFC64	TIME_TCK

Table 16 - IEC_ALARM called blocks

3.6.4 I/O description

I/O	I/O Name	Type	I/O Default	Comment
I	R0_CONNECT	ANY(Struct)		Connection to IEC61850_COM block DB
I	ADDRESS	BOOL	1	IEC 61850 tag address
I	TIMEOUTS	INT	5000	Timeout in milliseconds
I	COUNTABLE	BOOL	1	Internal value
I	EN_MSG			1 = enable alarming in WinCC
I	MSG_EVID	DWORD		Alarm_8 message ID
O	QERR0	BOOL	1	1 = Connection to IEC61850_COM block 0 faulty
O	QCOMERR0	BOOL	1	Communication IEC61850_COM block 0 not ok
O	QBAD	BOOL	1	0 = Data valid
O	ALARM	REAL	0	Alarm value (BOOL)
O	TIMEST	DT		Time Stamp of Value
O	MSG_DONE	BOOL	0	1 = ALARM_8 DONE
O	QMSG_ERR	BOOL	0	1 = ALARM_8 Error
O	QMSG_SUP	BOOL	0	1 = Message suppression active
O	MSG_STAT	WORD	0	ALARM_8P: STATUS Output

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I/O	I/O Name	Type	I/O De-fault	Comment
O	MSG_ACK	WORD	0	ALARM_8P: STATUS Output

Table 17- IEC_ALARM I/O description

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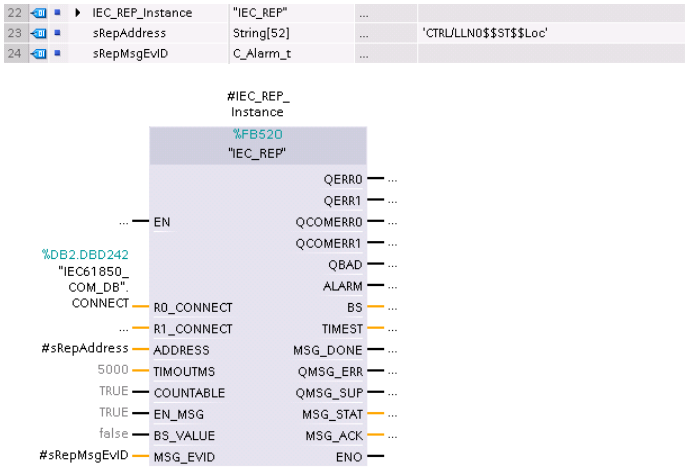
3.7 IEC_REP (Report - BOOL tag with timestamp)

3.7.1 Block screenshot



Picture 6 - IEC_REP screenshot

3.7.2 Block description

IEC_REP reads one BOOL value or one BITSTRING value asynchronous via IEC 61850 Report mechanism with its timestamp. This block is not supported by S7-300 CPUs.

To use this Report block, the IEC 61850 device has to support the IEC61850 service Report. Further a DataSet containing the tag (addressed with IEC_REP) has to exist in the device. The DataSet name and its address for Reporting has to be set in IEC61850_COM: RP_DSADDR. Furthermore enabling Reporting has to be executed successfully. IEC61850_COM: QB_EN_RP has to be “0” after initialization.

ADDRESS
The address has to be set without the IEC 61850 objects attribute name, only the IEC 61850 object name has to be set.

Note: The IEC61850 address strings can also be generated and copied via the StatCon configuration tool.

Example for address:

“CTRL/LLN0$$ST$$LEDRs”

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EN_MSG
EN_MSG enables Alarming in WinCC. Special messages can be specified. Please see chapter 2.3.3 Set up user defined WinCC messages for a explanation on how do setup individual WinCC messages for a function block.

BS_VALUE
Please set up BS_VALUE depending on the data type of your value. If the value you want to report is a BITSTRING value, you have to set up BS_VALUE with 1 (TRUE). If it is a BOOL value, please set up BS_VALUE with 0 (FALSE – default).

Further Input/Output description is equal to IEC_RD_BO Block description. Please see chapter 3.3.2 Block description

Note:
If adding two IEC_REP tag blocks with the same address, only the first IEC_REP tag will be updated. The library allows no duplicate IEC_REP blocks.

3.7.3 Alarming

There are triggered two different messages, depending on the value data type (BOOL or BITSTRING). For both messages, the timestamps of the IEC61850 report event (e.g. switch change time in IEC61850 server device) is delivered to WinCC.

BOOL value (BS_VALUE = FALSE)

Message no.	Block parameters	Default message text	Message class
1	ALARM	Report Alarm Message 1	ALARM - high

BITSTRING value (BS_VALUE = TRUE)

Message no.	Block parameters	Default message text	Message class
2	ALARM	Bitstring value changed. Value: @1 x %6x@	ALARM - high

Associated value	Block parameters
1	BS

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3.7.4 Called blocks

Declaration/Block number	Declaration/Block name
SFB35	ALARM_8P
UDT18	BST_REP
UDT8	LINK_INFO
FC10	EQ_STRING
FC21	LEN
SFC20	BLKMOV
SFC64	TIME_TCK

Table 18 - IEC_REP called blocks

3.7.5 I/O description

I/O	I/O Name	Type	I/O De-fault	Comment
I	R0_CONNECT	ANY(Struct)		Connection to IEC61850_COM block DB
I	ADDRESS	BOOL	1	IEC 61850 tag address
I	TIMEOUTS	INT	5000	Timeout in milliseconds
I	COUNTABLE	BOOL	1	Internal value
I	EN_MSG	BOOL	1	1 = enable alarming in WinCC
I	BS_VALUE	BOOL	0	1 = value with BITRSTING type
I	MSG_EVID	DWORD		Alarm_8 message ID
O	QERR0	BOOL	1	1 = Connection to IEC61850_COM block 0 faulty
O	QCOMERR0	BOOL	1	Communication IEC61850_COM block 0 not ok
O	QBAD	BOOL	1	0 = Data valid
O	ALARM	REAL	0	Alarm value (BOOL)
O	TIMEST	DT		Time Stamp of Value
O	MSG_DONE	BOOL	0	1 = ALARM_8 DONE
O	QMSG_ERR	BOOL	0	1 = ALARM_8 Error
O	QMSG_SUP	BOOL	0	1 = Message suppression active
O	MSG_STAT	WORD	0	ALARM_8P: STATUS Output

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I/O	I/O Name	Type	I/O De-fault	Comment
O	MSG_ACK	WORD	0	ALARM_8P: STATUS Output

Table 19- IEC_REP I/O description

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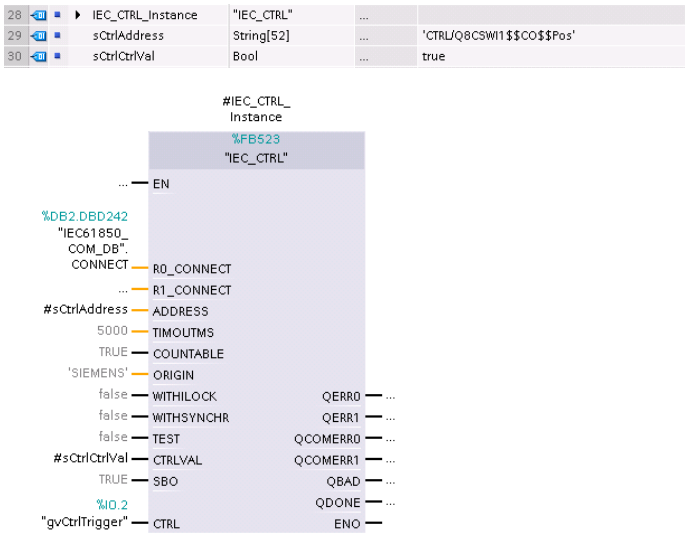
3.8 IEC_CTRL

3.8.1 Block screenshot



Picture 7 - IEC_CTRL screenshot

3.8.2 Block description

IEC_CTRL controls an IEC 61850 device switch using the IEC 61850 Control Service. If CTRL is set to “1” a Control command is executed with the Control value CTRLVAL.

ADDRESS
The address has to be set without the IEC 61850 objects attribute name, only the IEC 61850 object name has to be set. Addresses for Control objects contain the function constraint “CO”

Note: The IEC61850 address strings can also be generated and copied via the StatCon configuration tool.

Example for address:

“CTRL/LLN0$$CO$$LEDRs”

ORIGIN
Specify the command source (Actor). This string cannot be empty. Default value is “SIEMENS”

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WITHILOC
If WITHILOC is set, before executing control command an Interlock check is done in the device

WITHSYNC
If WITHSYNC is set, before executing control command a Synchro check is done in the device.

TEST
If TEST is set the switch command is only for testing, real switching is not executed.

CTRLVAL
Specifies the Command value: “0” stands for close, “1” represents open.

SBO
Specifies if “Select before Operate” should be used. If Select before Operate is selected, first a “Select” telegram is sent to the IEC61850 device, after acknowledging a second “Operate” telegram is sent, to control the switch. If SBO is disabled, only “Operate” telegram is sent to the device

QBAD
If DONE bit is not raised up for time TIMOUT, QBAD gets “1”, else QBAD equals “0”.

DONE
If the switch execution was successful, DONE bit is raised up.

Further Input/Output description is equal to IEC_RD_BO Block description. Please see chapter 3.3.2 Block description

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3.8.3 Called blocks

Declaration/Block number	Declaration/Block name
UDT6	BST_CTRL
UDT8	LINK_INFO
FC10	EQ_STRING
FC21	LEN
SFC20	BLKMOV
SFC64	TIME_TCK

Table 20 - IEC_CTRL called blocks

3.8.4 I/O description

I/O	I/O Name	Type	I/O Default	Comment
I	R0_CONNECT	ANY(Struct)		Connection to IEC61850_COM block DB
I	ADDRESS	BOOL	1	IEC 61850 tag address
I	TIMEOUTS	INT	5000	Timeout in milliseconds
I	COUNTABLE	BOOL	1	Internal value
I	ORIGIN	STRING[52		Actor name, control source
I	WITHILOCK			1 = enables Interlock check
I	WITHSYNCHR			1 = enables Synchro check
I	TEST			Only test switch control command
I	CTRLVAL			Switch command 1: open 0: close
I	SBO			1: Select before operate 0: only operate
IO	CTRL	BOOL		Control command trigger, is reset automatically
O	QERR0	BOOL	1	1 = Connection to IEC61850_COM block 0 faulty
O	QCOMERR0	BOOL	1	Communication IEC61850_COM block 0 not ok

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I/O	I/O Name	Type	I/O Default	Comment
O	QBAD	BOOL	1	0: QDONE raised up after CTRL = 1 1: QDONE did not raise up after CTRL = 1
O	QDONE	REAL	0	Switch operation executed successfully

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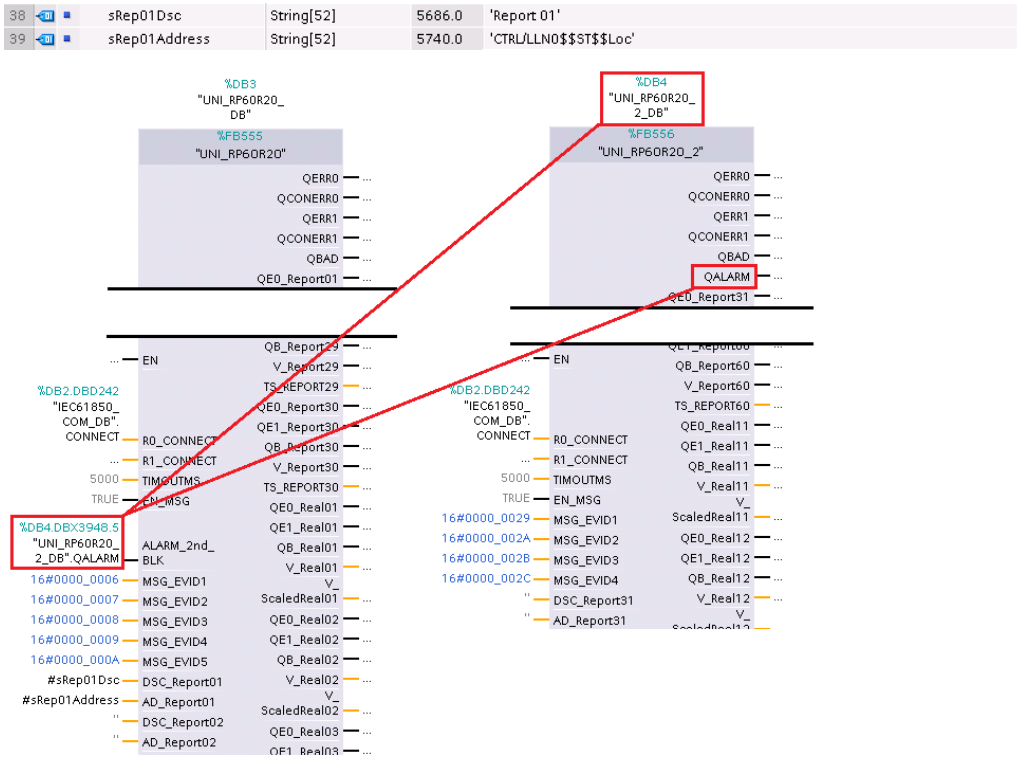
3.9 UNI_RP60R20 (60 Reports + 20 Real values)

3.9.1 Block screenshot



Picture 27 – UNI_RP60R20 and UNI_RP60R20_2 screenshot

3.9.2 Block description

The UNI_RP60R20 (FB555) block and its extension block UNI_RP60R20_2 (FB556) manages up to 60 Report tags and up to 20 Real value tags. The advantage of this universal block over single report- and real-blocks is the less time and effort for setting up the project. Only report values with BOOL type are supported. BITSTRING values are not supported.

To use this block, the IEC 61850 device has to support the IEC61850 service Report. Further a DataSet containing the tag (addressed with IEC_REP) has to exist in the device. The DataSet name and its address for Reporting have to be set in IEC61850_COM: RP_DSADDR. Furthermore enabling Reporting has to be executed successfully. IEC61850_COM: QB_EN_RP has to be “0” after initialization.

If you are using UNI_RP60R20 and UNI_RP60R20_2 together, you have to connect the value of Output QALARM from the UNI_RP60R20_2 data block

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(DB) to the input ALARM_2nd_BLK of the UNI_RP60R20 block (like shown in picture 27).

In the following the most important inputs and outputs will be explained detailed.

R0/1_CONNECT

R0_CONNECT input has to be connected to the IEC61850_COM block CONNECT output.

TIMOUTMS

TIMOUTMS specifies the time in ms the quality gets bad, if there is no actualization of the value.

EN_MSG
EN_MSG enables Alarming in WinCC. Special messages can be specified. Please see chapter 2.3.3 Set up user defined WinCC messages for a explanation on how do setup individual WinCC messages for a function block.

ALARM_2nd_Block (UNI_RP60R20)

This input only exists on UNI_RP60R20 block. It has to be connected to the output QALARM of the second block (UNI_RP60R20_2)

QALARM (UNI_RP60R20_2)

This output only exists on UNI_RP60R20_2 block. It has to be connected to the input ALARM_2nd_Block of the first block (UNI_RP60R20)

DSC_Reportxx

DSC_Reportxx (xx with the number from 01 to 60) is the description text for the report configured at AD_Rerportxx. It is shown in the WinCC faceplate for the related report.

AD_Reportxx

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AD_Reportxx (xx with the number from 01 to 60) has to be set up with the address of the data object within the report dataset. The address has to be entered as IEC61850 address string without the IEC 61850 objects attribute name, only the IEC 61850 object name has to be set. (Note: The additional character “$” has to replaced with “$$” in STEP 7). Example for address:

“CTRL/LLN0$$ST$$LEDRs”

AD_Realxx

AD_Realxx (xx with the number from 01 to 20) has to be set up with the address of the real value data attribute within IEC61850 server device. The address has to be entered as IEC61850 address string with the IEC 61850 objects attribute name. (Note: The additional character “$” has to replaced with “$$” in STEP 7). Example for address:

“CTRL/LLN0$$ST$$LEDRs$$stVal”

SF_Realxx

On SF_Realxx (xx with the number from 01 to 20), the scaling factor for the real value, addressed on AD_Realxx, can be set.

AD_Error

This input has to be set up with the address of the data attribute (bool value) which represents the error status of the connected IEC61850 server device. For a Siprotec it is the attribute: 'CTRL/CALH1$$ST$$GrAlm$$stVal'. This attribute is preconfigured on AD_Error.

AD_Warning

This input has to be set up with the address of the data attribute (bool value) which represents the warning status of the connected IEC61850 server device. For a Siprotec it is the attribute: 'CTRL/CALH1$$ST$$GrWrn$$stVal'. This attribute is preconfigured on AD_Warning.

QERR0/1

QERR0/1 is set, if the CFC connection to the IEC61850_COM block can not be found or is faulty.

QCOMERR0/1

QCOMERR0/1 is set, if the IEC 61850 communication the IEC61850_COM handles is not working properly. IEC61850_COM: QSTATE != ZYKLCOM

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QBAD

QBAD is set, if the values of one or more real tags or reports are not valid anymore, or if the bool- value, addressed with AD_Error and AD_Warning, aren't valid anymore.

QE0_Reportxx

QE0_Reportxx (xx with the number from 01 to 60) is set, if the IEC 61850 communication of the related (internal) report is not working properly (first IEC61850_COM block).

QE1_Reportxx

QE1_Reportxx (xx with the number from 01 to 60) is set, if the IEC 61850 communication of the related (internal) report is not working properly (second IEC61850_COM block).

QE0_Realxx

QE0_Realxx (xx with the number from 01 to 20) is set, if the IEC 61850 communication of the related (internal) real value is not working properly (first IEC61850_COM block).

QE1_Realxx

QE1_Realxx (xx with the number from 01 to 20) is set, if the IEC 61850 communication of the related (internal) real value is not working properly (second IEC61850_COM block).

QB_Reportxx (Bad value)

QB_Reportxx (xx with the number from 01 to 60) is set, if the value of the related (internal) report is not valid anymore.

Possible reasons are:

- No connection to any IEC61850_COM block (block internal)
- No IEC 61850 communication running
- Address string not set properly, value was not updated for time TIMOUTMS

QB_Realxx (Bad value)

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QB_Realxx (xx with the number from 01 to 60) is set, if the value of the related (internal) real tag is not valid anymore.

Possible reasons are:

- No connection to any IEC61850_COM block (block internal)
- No IEC 61850 communication running
- Address string not set properly, value was not updated for time TIMOUTMS

V_Reportxx

V_Reportxx (xx with the number from 01 to 60) represents the alarm value of the related report.

TS_REPORTxx

TS_REPORTxx (xx with the number from 01 to 60) is set with the timestamp of the related report send by the IEC61850 server device.

V_Realxx
V_Realxx (xx with the number from 01 to 20) is set with the not scaled real value of the related real tag.

V_ScaledRealxx
V_ScaledRealxx (xx with the number from 01 to 20) is set with the scaled real value of the related real tag. The scaling factor for the related real value can be set on input SF_Realxx.

3.9.3 Called blocks

Declaration/Block number	Declaration/Block name
FB517	IEC_RD_BO
FB519	IEC_RD_RL
FB520	IEC_RP
SFB35	ALARM_8P
UDT9	DWORD_ACCESS32BIT
FC21	LEN

Table 33 – UNI_RP60R20 and UNI_RP60R20_2 called blocks

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3.9.4 I/O description UNI_RP60R20 block

I/O	I/O Name	Type	I/O Default	Comment
I	R0_CONNECT	ANY		Connection to IEC_COM block
I	R1_CONNECT	ANY		Connection to IEC_COM block
I	TIMOUTMS	INT	5000	Timeout [ms]
I	EN_MSG	BOOL	1	1 = 8P Alarm
I	ALARM_2nd_BLK	BOOL	0	Connection to UNI_RP60R20_2 block
I	MSG_EVID1	DWORD	2	
I	MSG_EVID2	DWORD	2	
I	MSG_EVID3	DWORD	2	
I	MSG_EVID4	DWORD	2	
I	MSG_EVID5	DWORD	2	
I	DSC_Report01	STRING[52]		Description for Report Bool 01
I	AD_Report01	STRING[52]		Tag Address for Report Bool 01
I	DSC_Report02	STRING[52]		Description for Report Bool 02
I	AD_Report02	STRING[52]		Tag Address for Report Bool 02
I	DSC_Report03	STRING[52]		Description for Report Bool 03
I	AD_Report03	STRING[52]		Tag Address for Report Bool 03
I	DSC_Report04	STRING[52]		Description for Report Bool 04
I	AD_Report04	STRING[52]		Tag Address for Report Bool 04
I	DSC_Report05	STRING[52]		Description for Report Bool 05
I	AD_Report05	STRING[52]		Tag Address for Report Bool 05
I	DSC_Report06	STRING[52]		Description for Report Bool 06
I	AD_Report06	STRING[52]		Tag Address for Report Bool 06
I	DSC_Report07	STRING[52]		Description for Report Bool 07
I	AD_Report07	STRING[52]		Tag Address for Report Bool 07
I	DSC_Report08	STRING[52]		Description for Report Bool 08
I	AD_Report08	STRING[52]		Tag Address for Report Bool 08
I	DSC_Report09	STRING[52]		Description for Report Bool 09
I	AD_Report09	STRING[52]		Tag Address for Report Bool 09
I	DSC_Report10	STRING[52]		Description for Report Bool 10
I	AD_Report10	STRING[52]		Tag Address for Report Bool 10

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I/O	I/O Name	Type	I/O De-fault	Comment
I	DSC_Report11	STRING[52]		Description for Report Bool 11
I	AD_Report11	STRING[52]		Tag Address for Report Bool 11
I	DSC_Report12	STRING[52]		Description for Report Bool 12
I	AD_Report12	STRING[52]		Tag Address for Report Bool 12
I	DSC_Report13	STRING[52]		Description for Report Bool 13
I	AD_Report13	STRING[52]		Tag Address for Report Bool 13
I	DSC_Report14	STRING[52]		Description for Report Bool 14
I	AD_Report14	STRING[52]		Tag Address for Report Bool 14
I	DSC_Report15	STRING[52]		Description for Report Bool 15
I	AD_Report15	STRING[52]		Tag Address for Report Bool 15
I	DSC_Report16	STRING[52]		Description for Report Bool 16
I	AD_Report16	STRING[52]		Tag Address for Report Bool 16
I	DSC_Report17	STRING[52]		Description for Report Bool 17
I	AD_Report17	STRING[52]		Tag Address for Report Bool 17
I	DSC_Report18	STRING[52]		Description for Report Bool 18
I	AD_Report18	STRING[52]		Tag Address for Report Bool 18
I	DSC_Report19	STRING[52]		Description for Report Bool 19
I	AD_Report19	STRING[52]		Tag Address for Report Bool 19
I	DSC_Report20	STRING[52]		Description for Report Bool 20
I	AD_Report20	STRING[52]		Tag Address for Report Bool 20
I	DSC_Report21	STRING[52]		Description for Report Bool 21
I	AD_Report21	STRING[52]		Tag Address for Report Bool 21
I	DSC_Report22	STRING[52]		Description for Report Bool 22
I	AD_Report22	STRING[52]		Tag Address for Report Bool 22
I	DSC_Report23	STRING[52]		Description for Report Bool 23
I	AD_Report23	STRING[52]		Tag Address for Report Bool 23
I	DSC_Report24	STRING[52]		Description for Report Bool 24
I	AD_Report24	STRING[52]		Tag Address for Report Bool 24
I	DSC_Report25	STRING[52]		Description for Report Bool 25
I	AD_Report25	STRING[52]		Tag Address for Report Bool 25
I	DSC_Report26	STRING[52]		Description for Report Bool 26

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I/O	I/O Name	Type	I/O Default	Comment
I	AD_Report26	STRING[52]		Tag Address for Report Bool 26
I	DSC_Report27	STRING[52]		Description for Report Bool 27
I	AD_Report27	STRING[52]		Tag Address for Report Bool 27
I	DSC_Report28	STRING[52]		Description for Report Bool 28
I	AD_Report28	STRING[52]		Tag Address for Report Bool 28
I	DSC_Report29	STRING[52]		Description for Report Bool 29
I	AD_Report29	STRING[52]		Tag Address for Report Bool 29
I	DSC_Report30	STRING[52]		Description for Report Bool 30
I	AD_Report30	STRING[52]		Tag Address for Report Bool 30
I	AD_Real01	STRING[52]		Tag Address Real 01
I	SF_Real01	INT	0	Scaling Factor Real 01
I	AD_Real02	STRING[52]		Tag Address Real 02
I	SF_Real02	INT	0	Scaling Factor Real 02
I	AD_Real03	STRING[52]		Tag Address Real 03
I	SF_Real03	INT	0	Scaling Factor Real 03
I	AD_Real04	STRING[52]		Tag Address Real 04
I	SF_Real04	INT	0	Scaling Factor Real 04
I	AD_Real05	STRING[52]		Tag Address Real 05
I	SF_Real05	INT	0	Scaling Factor Real 05
I	AD_Real06	STRING[52]		Tag Address Real 06
I	SF_Real06	INT	0	Scaling Factor Real 06
I	AD_Real07	STRING[52]		Tag Address Real 07
I	SF_Real07	INT	0	Scaling Factor Real 07
I	AD_Real08	STRING[52]		Tag Address Real 08
I	SF_Real08	INT	0	Scaling Factor Real 08
I	AD_Real09	STRING[52]		Tag Address Real 09
I	SF_Real09	INT	0	Scaling Factor Real 09
I	AD_Real10	STRING[52]		Tag Address Real 10
I	SF_Real10	INT	0	Scaling Factor Real 10

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I/O	I/O Name	Type	I/O De-fault	Comment
I	AD_Error	STRING[52]	'CTRL/CALH1$$ST$$GrAlm$$stVal'	Tag Address Group alarm
I	AD_Warning	STRING[52]	'CTRL/CALH1$$ST$$GrWrn$$stVal'	Tag Address Group warning
O	QERR0	BOOL	1	
O	QCONERR0	BOOL	1	
O	QERR1	BOOL	1	
O	QCONERR1	BOOL	1	
O	QBAD	BOOL	1	
O	QE0_Report01	BOOL	0	
O	QE1_Report01	BOOL	0	
O	QB_Report01	BOOL	0	
O	V_Report01	BOOL	0	Value Report BOOL 01
O	TS_REPORT01	TIME		
O	QE0_Report02	BOOL	0	
O	QE1_Report02	BOOL	0	
O	QB_Report02	BOOL	0	
O	V_Report02	BOOL	0	Value Report BOOL 02
O	TS_REPORT02	TIME		
O	QE0_Report03	BOOL	0	
O	QE1_Report03	BOOL	0	
O	QB_Report03	BOOL	0	
O	V_Report03	BOOL	0	Value Report BOOL 03
O	TS_REPORT03	TIME		
O	QE0_Report04	BOOL	0	
O	QE1_Report04	BOOL	0	
O	QB_Report04	BOOL	0	
O	V_Report04	BOOL	0	Value Report BOOL 04

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I/O	I/O Name	Type	I/O Default	Comment
O	TS_REPORT04	TIME		
O	QE0_Report05	BOOL	0	
O	QE1_Report05	BOOL	0	
O	QB_Report05	BOOL	0	
O	V_Report05	BOOL	0	Value Report BOOL 05
O	TS_REPORT05	TIME		
O	QE0_Report06	BOOL	0	
O	QE1_Report06	BOOL	0	
O	QB_Report06	BOOL	0	
O	V_Report06	BOOL	0	Value Report BOOL 06
O	TS_REPORT06	TIME		
O	QE0_Report07	BOOL	0	
O	QE1_Report07	BOOL	0	
O	QB_Report07	BOOL	0	
O	V_Report07	BOOL	0	Value Report BOOL 07
O	TS_REPORT07	TIME		
O	QE0_Report08	BOOL	0	
O	QE1_Report08	BOOL	0	
O	QB_Report08	BOOL	0	
O	V_Report08	BOOL	0	Value Report BOOL 08
O	TS_REPORT08	TIME		
O	QE0_Report09	BOOL	0	
O	QE1_Report09	BOOL	0	
O	QB_Report09	BOOL	0	
O	V_Report09	BOOL	0	Value Report BOOL 09
O	TS_REPORT09	TIME		
O	QE0_Report10	BOOL	0	
O	QE1_Report10	BOOL	0	
O	QB_Report10	BOOL	0	
O	V_Report10	BOOL	0	Value Report BOOL 10
O	TS_REPORT10	TIME		

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I/O	I/O Name	Type	I/O Default	Comment
O	QE0_Report11	BOOL	0	
O	QE1_Report11	BOOL	0	
O	QB_Report11	BOOL	0	
O	V_Report11	BOOL	0	Value Report BOOL 11
O	TS_REPORT11	TIME		
O	QE0_Report12	BOOL	0	
O	QE1_Report12	BOOL	0	
O	QB_Report12	BOOL	0	
O	V_Report12	BOOL	0	Value Report BOOL 12
O	TS_REPORT12	TIME		
O	QE0_Report13	BOOL	0	
O	QE1_Report13	BOOL	0	
O	QB_Report13	BOOL	0	
O	V_Report13	BOOL	0	Value Report BOOL 13
O	TS_REPORT13	TIME		
O	QE0_Report14	BOOL	0	
O	QE1_Report14	BOOL	0	
O	QB_Report14	BOOL	0	
O	V_Report14	BOOL	0	Value Report BOOL 14
O	TS_REPORT14	TIME		
O	QE0_Report15	BOOL	0	
O	QE1_Report15	BOOL	0	
O	QB_Report15	BOOL	0	
O	V_Report15	BOOL	0	Value Report BOOL 15
O	TS_REPORT15	TIME		
O	QE0_Report16	BOOL	0	
O	QE1_Report16	BOOL	0	
O	QB_Report16	BOOL	0	
O	V_Report16	BOOL	0	Value Report BOOL 16
O	TS_REPORT16	TIME		
O	QE0_Report17	BOOL	0	

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I/O	I/O Name	Type	I/O Default	Comment
O	QE1_Report17	BOOL	0	
O	QB_Report17	BOOL	0	
O	V_Report17	BOOL	0	Value Report BOOL 17
O	TS_REPORT17	TIME		
O	QE0_Report18	BOOL	0	
O	QE1_Report18	BOOL	0	
O	QB_Report18	BOOL	0	
O	V_Report18	BOOL	0	Value Report BOOL 18
O	TS_REPORT18	TIME		
O	QE0_Report19	BOOL	0	
O	QE1_Report19	BOOL	0	
O	QB_Report19	BOOL	0	
O	V_Report19	BOOL	0	Value Report BOOL 19
O	TS_REPORT19	TIME		
O	QE0_Report20	BOOL	0	
O	QE1_Report20	BOOL	0	
O	QB_Report20	BOOL	0	
O	V_Report20	BOOL	0	Value Report BOOL 20
O	TS_REPORT20	TIME		
O	QE0_Report21	BOOL	0	
O	QE1_Report21	BOOL	0	
O	QB_Report21	BOOL	0	
O	V_Report21	BOOL	0	Value Report BOOL 21
O	TS_REPORT21	TIME		
O	QE0_Report22	BOOL	0	
O	QE1_Report22	BOOL	0	
O	QB_Report22	BOOL	0	
O	V_Report22	BOOL	0	Value Report BOOL 22
O	TS_REPORT22	TIME		
O	QE0_Report23	BOOL	0	
O	QE1_Report23	BOOL	0	

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I/O	I/O Name	Type	I/O Default	Comment
O	QB_Report23	BOOL	0	
O	V_Report23	BOOL	0	Value Report BOOL 23
O	TS_REPORT23	TIME		
O	QE0_Report24	BOOL	0	
O	QE1_Report24	BOOL	0	
O	QB_Report24	BOOL	0	
O	V_Report24	BOOL	0	Value Report BOOL 24
O	TS_REPORT24	TIME		
O	QE0_Report25	BOOL	0	
O	QE1_Report25	BOOL	0	
O	QB_Report25	BOOL	0	
O	V_Report25	BOOL	0	Value Report BOOL 25
O	TS_REPORT25	TIME		
O	QE0_Report26	BOOL	0	
O	QE1_Report26	BOOL	0	
O	QB_Report26	BOOL	0	
O	V_Report26	BOOL	0	Value Report BOOL 26
O	TS_REPORT26	TIME		
O	QE0_Report27	BOOL	0	
O	QE1_Report27	BOOL	0	
O	QB_Report27	BOOL	0	
O	V_Report27	BOOL	0	Value Report BOOL 27
O	TS_REPORT27	TIME		
O	QE0_Report28	BOOL	0	
O	QE1_Report28	BOOL	0	
O	QB_Report28	BOOL	0	
O	V_Report28	BOOL	0	Value Report BOOL 28
O	TS_REPORT28	TIME		
O	QE0_Report29	BOOL	0	
O	QE1_Report29	BOOL	0	
O	QB_Report29	BOOL	0	

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I/O	I/O Name	Type	I/O Default	Comment
O	V_Report29	BOOL	0	Value Report BOOL 29
O	TS_REPORT29	TIME		
O	QE0_Report30	BOOL	0	
O	QE1_Report30	BOOL	0	
O	QB_Report30	BOOL	0	
O	V_Report30	BOOL	0	Value Report BOOL 30
O	TS_REPORT30	TIME		
O	QE0_Real01	BOOL	0	
O	QE1_Real01	BOOL	0	
O	QB_Real01	BOOL	0	
O	V_Real01	REAL	0.0	Value REAL 01
O	V_ScaledReal01	REAL	0.0	Scaled Value REAL 01
O	QE0_Real02	BOOL	0	
O	QE1_Real02	BOOL	0	
O	QB_Real02	BOOL	0	
O	V_Real02	REAL	0.0	Value REAL 02
O	V_ScaledReal02	REAL	0.0	Scaled Value REAL 02
O	QE0_Real03	BOOL	0	
O	QE1_Real03	BOOL	0	
O	QB_Real03	BOOL	0	
O	V_Real03	REAL	0.0	Value REAL 03
O	V_ScaledReal03	REAL	0.0	Scaled Value REAL 03
O	QE0_Real04	BOOL	0	
O	QE1_Real04	BOOL	0	
O	QB_Real04	BOOL	0	
O	V_Real04	REAL	0.0	Value REAL 04
O	V_ScaledReal04	REAL	0.0	Scaled Value REAL 04
O	QE0_Real05	BOOL	0	
O	QE1_Real05	BOOL	0	
O	QB_Real05	BOOL	0	
O	V_Real05	REAL	0.0	Value REAL 05

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I/O	I/O Name	Type	I/O De-fault	Comment
O	V_ScaledReal05	REAL	0.0	Scaled Value REAL 05
O	QE0_Real06	BOOL	0	
O	QE1_Real06	BOOL	0	
O	QB_Real06	BOOL	0	
O	V_Real06	REAL	0.0	Value REAL 06
O	V_ScaledReal06	REAL	0.0	Scaled Value REAL 06
O	QE0_Real07	BOOL	0	
O	QE1_Real07	BOOL	0	
O	QB_Real07	BOOL	0	
O	V_Real07	REAL	0.0	Value REAL 07
O	V_ScaledReal07	REAL	0.0	Scaled Value REAL 07
O	QE0_Real08	BOOL	0	
O	QE1_Real08	BOOL	0	
O	QB_Real08	BOOL	0	
O	V_Real08	REAL	0.0	Value REAL 08
O	V_ScaledReal08	REAL	0.0	Scaled Value REAL 08
O	QE0_Real09	BOOL	0	
O	QE1_Real09	BOOL	0	
O	QB_Real09	BOOL	0	
O	V_Real09	REAL	0.0	Value REAL 09
O	V_ScaledReal09	REAL	0.0	Scaled Value REAL 09
O	QE0_Real10	BOOL	0	
O	QE1_Real10	BOOL	0	
O	QB_Real10	BOOL	0	
O	V_Real10	REAL	0.0	Value REAL 10
O	V_ScaledReal10	REAL	0.0	Scaled Value REAL 10
O	QE0_Error	BOOL	0	
O	QE1_Error	BOOL	0	
O	QB_Error	BOOL	0	
O	Error	BOOL	0	Group alarm
O	QE0_Warning	BOOL	0	

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I/O	I/O Name	Type	I/O Default	Comment
O	QE1_Warning	BOOL	0	
O	QB_Warning	BOOL	0	
O	Warning	BOOL	0	Group warning
O	STATUS_RP_QE0_1	DWORD	16#00000000	Report Status Word QE0_1 for WinCC/Scada
O	STATUS_RP_QE1_1	DWORD	16#00000000	Report Status Word QE1_1 for WinCC/Scada
O	STATUS_RP_QB_1	DWORD	16#00000000	Report Status Word QBx 1 for WinCC/Scada
O	STATUS_R_QE0_1	DWORD	16#00000000	Real Status Word QE0_1 for WinCC/Scada
O	STATUS_R_QE1_1	DWORD	16#00000000	Real Status Word QE1_1 for WinCC/Scada
O	STATUS_R_QB_1	DWORD	16#00000000	Real Status Word QB_1 for WinCC/Scada
O	MSG_DONE1	BOOL	0	
O	MSG_STAT1	WORD	16#0000	ALARM_8P: STATUS Output
O	MSG_ACK1	WORD	16#0000	ALARM_8P: ACK_STATE Output
O	QMSG_ERR1	BOOL	0	1 = ALARM_8P Error
O	QMSG_SUP1	BOOL	0	1 = Message suppression active
O	MSG_DONE2	BOOL	0	
O	MSG_STAT2	WORD	16#0000	ALARM_8P: STATUS Output
O	MSG_ACK2	WORD	16#0000	ALARM_8P: ACK_STATE Output
O	QMSG_ERR2	BOOL	0	1 = ALARM_8P Error
O	QMSG_SUP2	BOOL	0	1 = Message suppression active
O	MSG_DONE3	BOOL	0	
O	MSG_STAT3	WORD	16#0000	ALARM_8P: STATUS Output
O	MSG_ACK3	WORD	16#0000	ALARM_8P: ACK_STATE Output
O	QMSG_ERR3	BOOL	0	1 = ALARM_8P Error

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I/O	I/O Name	Type	I/O Default	Comment
O	QMSG_SUP3	BOOL	0	1 = Message suppression active
O	MSG_DONE4	BOOL	0	
O	MSG_STAT4	WORD	16#0000	ALARM_8P: STATUS Output
O	MSG_ACK4	WORD	16#0000	ALARM_8P: ACK_STATE Output
O	QMSG_ERR4	BOOL	0	1 = ALARM_8P Error
O	QMSG_SUP4	BOOL	0	1 = Message suppression active
O	QMSG_SUP	BOOL	0	1 = one Message suppression active

Table 34 - UNI_RP60R20 I/O description

3.9.5 I/O description UNI_RP60R20_2 block

I/O	I/O Name	Type	I/O Default	Comment
I	R0_CONNECT	ANY		Connection to IEC_COM block
I	R1_CONNECT	ANY		Connection to IEC_COM block
I	TIMOUTMS	INT	5000	Timeout [ms]
I	EN_MSG	BOOL	1	1 = 8P Alarm
I	MSG_EVID1	DWORD	2	
I	MSG_EVID2	DWORD	2	
I	MSG_EVID3	DWORD	2	
I	MSG_EVID4	DWORD	2	
I	DSC_Report31	STRING[52]		Description for Report Bool 31

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I/O	I/O Name	Type	I/O Default	Comment
I	AD_Report31	STRING[52]		Tag Address for Report Bool 31
I	DSC_Report32	STRING[52]		Description for Report Bool 32
I	AD_Report32	STRING[52]		Tag Address for Report Bool 32
I	DSC_Report33	STRING[52]		Description for Report Bool 33
I	AD_Report33	STRING[52]		Tag Address for Report Bool 33
I	DSC_Report34	STRING[52]		Description for Report Bool 34
I	AD_Report34	STRING[52]		Tag Address for Report Bool 34
I	DSC_Report35	STRING[52]		Description for Report Bool 35
I	AD_Report35	STRING[52]		Tag Address for Report Bool 35
I	DSC_Report36	STRING[52]		Description for Report Bool 36
I	AD_Report36	STRING[52]		Tag Address for Report Bool 36
I	DSC_Report37	STRING[52]		Description for Report Bool 37
I	AD_Report37	STRING[52]		Tag Address for Report Bool 37
I	DSC_Report38	STRING[52]		Description for Report Bool 38
I	AD_Report38	STRING[52]		Tag Address for Report Bool 38
I	DSC_Report39	STRING[52]		Description for Report Bool 39
I	AD_Report39	STRING[52]		Tag Address for Report Bool 39
I	DSC_Report40	STRING[52]		Description for Report Bool 40
I	AD_Report40	STRING[52]		Tag Address for Report Bool 40
I	DSC_Report41	STRING[52]		Description for Report Bool 41
I	AD_Report41	STRING[52]		Tag Address for Report Bool 41
I	DSC_Report42	STRING[52]		Description for Report Bool 42
I	AD_Report42	STRING[52]		Tag Address for Report Bool 42
I	DSC_Report43	STRING[52]		Description for Report Bool 43
I	AD_Report43	STRING[52]		Tag Address for Report Bool 43
I	DSC_Report44	STRING[52]		Description for Report Bool 44
I	AD_Report44	STRING[52]		Tag Address for Report Bool 44
I	DSC_Report45	STRING[52]		Description for Report Bool 45
I	AD_Report45	STRING[52]		Tag Address for Report Bool 45
I	DSC_Report46	STRING[52]		Description for Report Bool 46
I	AD_Report46	STRING[52]		Tag Address for Report Bool 46

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I/O	I/O Name	Type	I/O De-fault	Comment
I	DSC_Report47	STRING[52]		Description for Report Bool 47
I	AD_Report47	STRING[52]		Tag Address for Report Bool 47
I	DSC_Report48	STRING[52]		Description for Report Bool 48
I	AD_Report48	STRING[52]		Tag Address for Report Bool 48
I	DSC_Report49	STRING[52]		Description for Report Bool 49
I	AD_Report49	STRING[52]		Tag Address for Report Bool 49
I	DSC_Report50	STRING[52]		Description for Report Bool 50
I	AD_Report50	STRING[52]		Tag Address for Report Bool 50
I	DSC_Report51	STRING[52]		Description for Report Bool 51
I	AD_Report51	STRING[52]		Tag Address for Report Bool 51
I	DSC_Report52	STRING[52]		Description for Report Bool 52
I	AD_Report52	STRING[52]		Tag Address for Report Bool 52
I	DSC_Report53	STRING[52]		Description for Report Bool 53
I	AD_Report53	STRING[52]		Tag Address for Report Bool 53
I	DSC_Report54	STRING[52]		Description for Report Bool 54
I	AD_Report54	STRING[52]		Tag Address for Report Bool 54
I	DSC_Report55	STRING[52]		Description for Report Bool 55
I	AD_Report55	STRING[52]		Tag Address for Report Bool 55
I	DSC_Report56	STRING[52]		Description for Report Bool 56
I	AD_Report56	STRING[52]		Tag Address for Report Bool 56
I	DSC_Report57	STRING[52]		Description for Report Bool 57
I	AD_Report57	STRING[52]		Tag Address for Report Bool 57
I	DSC_Report58	STRING[52]		Description for Report Bool 58
I	AD_Report58	STRING[52]		Tag Address for Report Bool 58
I	DSC_Report59	STRING[52]		Description for Report Bool 59
I	AD_Report59	STRING[52]		Tag Address for Report Bool 59
I	DSC_Report60	STRING[52]		Description for Report Bool 60
I	AD_Report60	STRING[52]		Tag Address for Report Bool 60
I	AD_Real11	STRING[52]		Tag Address Real 11
I	SF_Real11	INT	0	Scaling Factor Real 11
I	AD_Real12	STRING[52]		Tag Address Real 12

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I/O	I/O Name	Type	I/O Default	Comment
I	SF_Real12	INT	0	Scaling Factor Real 12
I	AD_Real13	STRING[52]		Tag Address Real 13
I	SF_Real13	INT	0	Scaling Factor Real 13
I	AD_Real14	STRING[52]		Tag Address Real 14
I	SF_Real14	INT	0	Scaling Factor Real 14
I	AD_Real15	STRING[52]		Tag Address Real 15
I	SF_Real15	INT	0	Scaling Factor Real 15
I	AD_Real16	STRING[52]		Tag Address Real 16
I	SF_Real16	INT	0	Scaling Factor Real 16
I	AD_Real17	STRING[52]		Tag Address Real 17
I	SF_Real17	INT	0	Scaling Factor Real 17
I	AD_Real18	STRING[52]		Tag Address Real 18
I	SF_Real18	INT	0	Scaling Factor Real 18
I	AD_Real19	STRING[52]		Tag Address Real 19
I	SF_Real19	INT	0	Scaling Factor Real 19
I	AD_Real20	STRING[52]		Tag Address Real 20
I	SF_Real20	INT	0	Scaling Factor Real 20
I	AD_Error	STRING[52]	'CTRL/CALH1$$ST$$GrAlm$$stVal'	Tag Address Group alarm
I	AD_Warning	STRING[52]	'CTRL/CALH1$$ST$$GrWrn$$stVal'	Tag Address Group warning
O	QERR0	BOOL	1	
O	QCONERR0	BOOL	1	
O	QERR1	BOOL	1	
O	QCONERR1	BOOL	1	
O	QBAD	BOOL	1	
O	QALARM	BOOL	0	
O	QE0_Report31	BOOL	0	

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I/O	I/O Name	Type	I/O Default	Comment
O	QE1_Report31	BOOL	0	
O	QB_Report31	BOOL	0	
O	V_Report31	BOOL	0	Value Report BOOL 31
O	TS_REPORT31	TIME		
O	QE0_Report32	BOOL	0	
O	QE1_Report32	BOOL	0	
O	QB_Report32	BOOL	0	
O	V_Report32	BOOL	0	Value Report BOOL 32
O	TS_REPORT32	TIME		
O	QE0_Report33	BOOL	0	
O	QE1_Report33	BOOL	0	
O	QB_Report33	BOOL	0	
O	V_Report33	BOOL	0	Value Report BOOL 33
O	TS_REPORT33	TIME		
O	QE0_Report34	BOOL	0	
O	QE1_Report34	BOOL	0	
O	QB_Report34	BOOL	0	
O	V_Report34	BOOL	0	Value Report BOOL 34
O	TS_REPORT34	TIME		
O	QE0_Report35	BOOL	0	
O	QE1_Report35	BOOL	0	
O	QB_Report35	BOOL	0	
O	V_Report35	BOOL	0	Value Report BOOL 35
O	TS_REPORT35	TIME		
O	QE0_Report36	BOOL	0	
O	QE1_Report36	BOOL	0	
O	QB_Report36	BOOL	0	
O	V_Report36	BOOL	0	Value Report BOOL 36
O	TS_REPORT36	TIME		
O	QE0_Report37	BOOL	0	
O	QE1_Report37	BOOL	0	

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I/O	I/O Name	Type	I/O Default	Comment
O	QB_Report37	BOOL	0	
O	V_Report37	BOOL	0	Value Report BOOL 37
O	TS_REPORT37	TIME		
O	QE0_Report38	BOOL	0	
O	QE1_Report38	BOOL	0	
O	QB_Report38	BOOL	0	
O	V_Report38	BOOL	0	Value Report BOOL 38
O	TS_REPORT38	TIME		
O	QE0_Report39	BOOL	0	
O	QE1_Report39	BOOL	0	
O	QB_Report39	BOOL	0	
O	V_Report39	BOOL	0	Value Report BOOL 39
O	TS_REPORT39	TIME		
O	QE0_Report40	BOOL	0	
O	QE1_Report40	BOOL	0	
O	QB_Report40	BOOL	0	
O	V_Report40	BOOL	0	Value Report BOOL 40
O	TS_REPORT40	TIME		
O	QE0_Report41	BOOL	0	
O	QE1_Report41	BOOL	0	
O	QB_Report41	BOOL	0	
O	V_Report41	BOOL	0	Value Report BOOL 41
O	TS_REPORT41	TIME		
O	QE0_Report42	BOOL	0	
O	QE1_Report42	BOOL	0	
O	QB_Report42	BOOL	0	
O	V_Report42	BOOL	0	Value Report BOOL 42
O	TS_REPORT42	TIME		
O	QE0_Report43	BOOL	0	
O	QE1_Report43	BOOL	0	
O	QB_Report43	BOOL	0	

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I/O	I/O Name	Type	I/O Default	Comment
O	V_Report43	BOOL	0	Value Report BOOL 43
O	TS_REPORT43	TIME		
O	QE0_Report44	BOOL	0	
O	QE1_Report44	BOOL	0	
O	QB_Report44	BOOL	0	
O	V_Report44	BOOL	0	Value Report BOOL 44
O	TS_REPORT44	TIME		
O	QE0_Report45	BOOL	0	
O	QE1_Report45	BOOL	0	
O	QB_Report45	BOOL	0	
O	V_Report45	BOOL	0	Value Report BOOL 45
O	TS_REPORT45	TIME		
O	QE0_Report46	BOOL	0	
O	QE1_Report46	BOOL	0	
O	QB_Report46	BOOL	0	
O	V_Report46	BOOL	0	Value Report BOOL 46
O	TS_REPORT46	TIME		
O	QE0_Report47	BOOL	0	
O	QE1_Report47	BOOL	0	
O	QB_Report47	BOOL	0	
O	V_Report47	BOOL	0	Value Report BOOL 47
O	TS_REPORT47	TIME		
O	QE0_Report48	BOOL	0	
O	QE1_Report48	BOOL	0	
O	QB_Report48	BOOL	0	
O	V_Report48	BOOL	0	Value Report BOOL 48
O	TS_REPORT48	TIME		
O	QE0_Report49	BOOL	0	
O	QE1_Report49	BOOL	0	
O	QB_Report49	BOOL	0	
O	V_Report49	BOOL	0	Value Report BOOL 49

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I/O	I/O Name	Type	I/O Default	Comment
O	TS_REPORT49	TIME		
O	QE0_Report50	BOOL	0	
O	QE1_Report50	BOOL	0	
O	QB_Report50	BOOL	0	
O	V_Report50	BOOL	0	Value Report BOOL 50
O	TS_REPORT50	TIME		
O	QE0_Report51	BOOL	0	
O	QE1_Report51	BOOL	0	
O	QB_Report51	BOOL	0	
O	V_Report51	BOOL	0	Value Report BOOL 51
O	TS_REPORT51	TIME		
O	QE0_Report52	BOOL	0	
O	QE1_Report52	BOOL	0	
O	QB_Report52	BOOL	0	
O	V_Report52	BOOL	0	Value Report BOOL 52
O	TS_REPORT52	TIME		
O	QE0_Report53	BOOL	0	
O	QE1_Report53	BOOL	0	
O	QB_Report53	BOOL	0	
O	V_Report53	BOOL	0	Value Report BOOL 53
O	TS_REPORT53	TIME		
O	QE0_Report54	BOOL	0	
O	QE1_Report54	BOOL	0	
O	QB_Report54	BOOL	0	
O	V_Report54	BOOL	0	Value Report BOOL 54
O	TS_REPORT54	TIME		
O	QE0_Report55	BOOL	0	
O	QE1_Report55	BOOL	0	
O	QB_Report55	BOOL	0	
O	V_Report55	BOOL	0	Value Report BOOL 55
O	TS_REPORT55	TIME		

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I/O	I/O Name	Type	I/O Default	Comment
O	QE0_Report56	BOOL	0	
O	QE1_Report56	BOOL	0	
O	QB_Report56	BOOL	0	
O	V_Report56	BOOL	0	Value Report BOOL 56
O	TS_REPORT56	TIME		
O	QE0_Report57	BOOL	0	
O	QE1_Report57	BOOL	0	
O	QB_Report57	BOOL	0	
O	V_Report57	BOOL	0	Value Report BOOL 57
O	TS_REPORT57	TIME		
O	QE0_Report58	BOOL	0	
O	QE1_Report58	BOOL	0	
O	QB_Report58	BOOL	0	
O	V_Report58	BOOL	0	Value Report BOOL 58
O	TS_REPORT58	TIME		
O	QE0_Report59	BOOL	0	
O	QE1_Report59	BOOL	0	
O	QB_Report59	BOOL	0	
O	V_Report59	BOOL	0	Value Report BOOL 59
O	TS_REPORT59	TIME		
O	QE0_Report60	BOOL	0	
O	QE1_Report60	BOOL	0	
O	QB_Report60	BOOL	0	
O	V_Report60	BOOL	0	Value Report BOOL 60
O	TS_REPORT60	TIME		
O	QE0_Real11	BOOL	0	
O	QE1_Real11	BOOL	0	
O	QB_Real11	BOOL	0	
O	V_Real11	REAL	0.0	Value REAL 11
O	V_ScaledReal11	REAL	0.0	Scaled Value REAL 11
O	QE0_Real12	BOOL	0	

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I/O	I/O Name	Type	I/O Default	Comment
O	QE1_Real12	BOOL	0	
O	QB_Real12	BOOL	0	
O	V_Real12	REAL	0.0	Value REAL 12
O	V_ScaledReal12	REAL	0.0	Scaled Value REAL 12
O	QE0_Real13	BOOL	0	
O	QE1_Real13	BOOL	0	
O	QB_Real13	BOOL	0	
O	V_Real13	REAL	0.0	Value REAL 13
O	V_ScaledReal13	REAL	0.0	Scaled Value REAL 13
O	QE0_Real14	BOOL	0	
O	QE1_Real14	BOOL	0	
O	QB_Real14	BOOL	0	
O	V_Real14	REAL	0.0	Value REAL 14
O	V_ScaledReal14	REAL	0.0	Scaled Value REAL 14
O	QE0_Real15	BOOL	0	
O	QE1_Real15	BOOL	0	
O	QB_Real15	BOOL	0	
O	V_Real15	REAL	0.0	Value REAL 15
O	V_ScaledReal15	REAL	0.0	Scaled Value REAL 15
O	QE0_Real16	BOOL	0	
O	QE1_Real16	BOOL	0	
O	QB_Real16	BOOL	0	
O	V_Real16	REAL	0.0	Value REAL 16
O	V_ScaledReal16	REAL	0.0	Scaled Value REAL 16
O	QE0_Real17	BOOL	0	
O	QE1_Real17	BOOL	0	
O	QB_Real17	BOOL	0	
O	V_Real17	REAL	0.0	Value REAL 17
O	V_ScaledReal17	REAL	0.0	Scaled Value REAL 17
O	QE0_Real18	BOOL	0	
O	QE1_Real18	BOOL	0	

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I/O	I/O Name	Type	I/O Default	Comment
O	QB_Real18	BOOL	0	
O	V_Real18	REAL	0.0	Value REAL 18
O	V_ScaledReal18	REAL	0.0	Scaled Value REAL 18
O	QE0_Real19	BOOL	0	
O	QE1_Real19	BOOL	0	
O	QB_Real19	BOOL	0	
O	V_Real19	REAL	0.0	Value REAL 19
O	V_ScaledReal19	REAL	0.0	Scaled Value REAL 19
O	QE0_Real20	BOOL	0	
O	QE1_Real20	BOOL	0	
O	QB_Real20	BOOL	0	
O	V_Real20	REAL	0.0	Value REAL 20
O	V_ScaledReal20	REAL	0.0	Scaled Value REAL 20
O	QE0_Error	BOOL	0	
O	QE1_Error	BOOL	0	
O	QB_Error	BOOL	0	
O	Error	BOOL	0	Group alarm
O	QE0_Warning	BOOL	0	
O	QE1_Warning	BOOL	0	
O	QB_Warning	BOOL	0	
O	Warning	BOOL	0	Group warning
O	STATUS_RP_QE0_2	DWORD	16#00000000	Report Status Word QE0_2 for WinCC/Scada
O	STATUS_RP_QE1_2	DWORD	16#00000000	Report Status Word QE1_2 for WinCC/Scada
O	STATUS_RP_QB_2	DWORD	16#00000000	Report Status Word QB 2 for WinCC/Scada
O	STATUS_R_QE0_2	DWORD	16#00000000	Real Status Word QE0_2 for WinCC/Scada
O	STATUS_R_QE1_2	DWORD	16#00000000	Real Status Word QE1_2 for WinCC/Scada
O	STATUS_R_QB_2	DWORD	16#00000000	Real Status Word QB_2 for WinCC/Scada

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I/O	I/O Name	Type	I/O De-fault	Comment
O	MSG_DONE5	BOOL	0	
O	MSG_STAT5	WORD	16#0000	ALARM_8P: STATUS Output
O	MSG_ACK5	WORD	16#0000	ALARM_8P: ACK_STATE Output
O	QMSG_ERR5	BOOL	0	1 = ALARM_8P Error
O	QMSG_SUP5	BOOL	0	1 = Message suppression active
O	MSG_DONE6	BOOL	0	
O	MSG_STAT6	WORD	16#0000	ALARM_8P: STATUS Output
O	MSG_ACK6	WORD	16#0000	ALARM_8P: ACK_STATE Output
O	QMSG_ERR6	BOOL	0	1 = ALARM_8P Error
O	QMSG_SUP6	BOOL	0	1 = Message suppression active
O	MSG_DONE7	BOOL	0	
O	MSG_STAT7	WORD	16#0000	ALARM_8P: STATUS Output
O	MSG_ACK7	WORD	16#0000	ALARM_8P: ACK_STATE Output
O	QMSG_ERR7	BOOL	0	1 = ALARM_8P Error
O	QMSG_SUP7	BOOL	0	1 = Message suppression active
O	MSG_DONE8	BOOL	0	
O	MSG_STAT8	WORD	16#0000	ALARM_8P: STATUS Output
O	MSG_ACK8	WORD	16#0000	ALARM_8P: ACK_STATE Output
O	QMSG_ERR8	BOOL	0	1 = ALARM_8P Error
O	QMSG_SUP8	BOOL	0	1 = Message suppression active
O	QMSG_SUP	BOOL		1 = Message suppression active

Table 35 - UNI_RP60R20_2 I/O description

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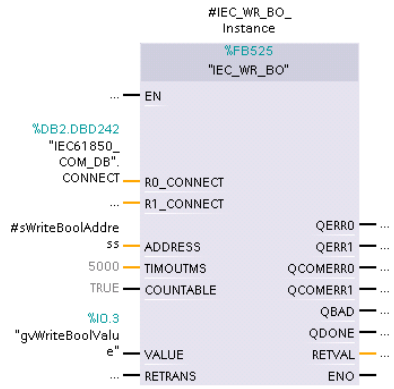
3.10 IEC_WR_BO

3.10.1 Block screenshot



Picture 8 - IEC_WR_BO screenshot

3.10.2 Block description

With the IEC_WR_BO block a Boolean variable can be written to an IEC61850 Server Device. This block can be used for example to write substitution values.

R0/1_CONNECT

R0_CONNECT input has to be connected to the IEC61850_COM block CONNECT output.

ADDRESS

The address for the tag has to be configured with the input ADDRESS. The address has to be entered as IEC61850 address string including the IEC61850 objects attribute name. (Note: The additional character “$” has to replaced with “$$” in STEP 7)

Note: The IEC61850 address strings can also be generated and copied via the StatCon configuration tool.

Example for address:

“CTRL/LLN0$$ST$$LEDRs$$stVal”

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TIMOUTMS

TIMOUTMS specifies the time in ms the quality gets bad, if the IEC61850 device does not respond with a positive acknowledge in between.

VALUE

Represents the Boolean value which should be written to the IEC61850 device. Write is performed on value change.

RETRANS

If RETRANS is set to “TRUE”, the current value will be retransmitted. Input resets automatically to “FALSE”.

QERR0

QERR0 is set, if the CFC connection to the IEC61850_COM block can not be found or is faulty.

QCOMERR0

QCOMERR0 is set, if the IEC 61850 communication the IEC61850_COM handles is not working properly. IEC61850_COM: QSTATE != ZYKLCOM

QBAD

QBAD is set, if the value is not valid anymore.

Possible reasons are:

- No connection to any IEC61850_COM block
- No IEC 61850 communication running
- Address string not set properly, value was not written successfully in between specified timeout
- Access rights: no permission for writing value / value cannot be overwritten

DONE

Done will be set to TRUE, after transmission of value

RETVAL

RETVAL shows theIEC61850 Write return value.

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3.10.3 Called blocks

Declaration/Block number	Declaration/Block name
UDT3	BST_BOOL
UDT8	LINK_INFO
FC10	EQ_STRING
FC21	LEN
SFC20	BLKMOV
SFC64	TIME_TCK

Table 21 - IEC_WR_BO called blocks

3.10.4 I/O description

I/O	I/O Name	Type	I/O De-fault	Comment
I	R0_CONNECT	ANY(Struct)		Connection to IEC61850_COM block DB
I	ADDRESS	STRING[52]		IEC61850 tag address
I	TIMEOUTS	INT	5000	Timeout in ms
I	COUNTABLE	BOOL	1	Internal value
I	VALUE	BOOL	1	Tag value to be written in device
I	RETRANS	BOOL	1	Retransmission of value
O	QERR0	BOOL	1	1 = Connection to IEC61850_COM block 0 faulty
O	QCOMERR0	BOOL	1	Communication IEC61850_COM block 0 not ok
O	QBAD	BOOL	1	0 = Data valid
O	QDONE	BOOL	0	Addressed value as BITSTRING
O	RETVAL	BYTE	0	Return code

Table 22- IEC_RD_BS I/O description

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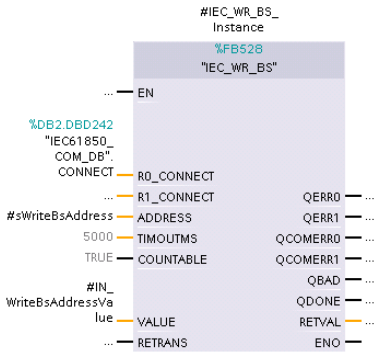
3.11 IEC_WR_BS

3.11.1 Block screenshot



Picture 9 - IEC_WR_BS screenshot

3.11.2 Block description

With the IEC_WR_BS block a Bitstring variable can be written in an IEC61850 Server Device. This block can be used for example to write substitution values.
Input/Output description is equal to IEC_WR_BO Block description. Please see chapter 3.10.2 Block description

3.11.3 Called blocks

Declaration/Block number	Declaration/Block name
UDT15	BST_BITSTRING
UDT8	LINK_INFO
FC10	EQ_STRING
FC21	LEN
SFC20	BLKMOV
SFC64	TIME_TCK

Table 23 - IEC_WR_BO called blocks

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3.11.4 I/O description

I/O	I/O Name	Type	I/O Default	Comment
I	R0_CONNECT	ANY(Struct)		Connection to IEC61850_COM block DB
I	ADDRESS	STRING[52]		IEC61850 tag address
I	TIMEOUTS	INT	5000	Timeout in ms
I	COUNTABLE	BOOL	1	Internal value
I	VALUE	DWORD	1	Tag value to be written in device
I	RETRANS	BOOL	1	Retransmission of value
O	QERR0	BOOL	1	1 = Connection to IEC61850_COM block 0 faulty
O	QCOMERR0	BOOL	1	Communication IEC61850_COM block 0 not ok
O	QBAD	BOOL	1	0 = Data valid
O	QDONE	BOOL	0	Addressed value as BITSTRING
O	RETVAL	BYTE	0	Return code

Table 24- IEC_RD_BS I/O description

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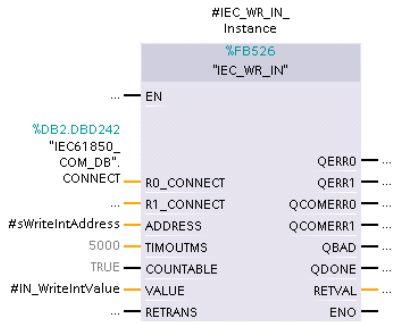
3.12 IEC_WR_IN

3.12.1 Block screenshot



Picture 10 - IEC_WR_IN screenshot

3.12.2 Block description

With the IEC_WR_IN block a Integer variable can be written in a IEC61850 Server Device. This block can be used for example to write substitution values.
Input/Output description is equal to IEC_WR_BO Block description. Please see chapter 3.10.2 Block description

3.12.3 Called blocks

Declaration/Block number	Declaration/Block name
UDT4	BST_INT
UDT8	LINK_INFO
FC10	EQ_STRING
FC21	LEN
SFC20	BLKMOV
SFC64	TIME_TCK

Table 25 - IEC_WR_IN called blocks

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3.12.4 I/O description

I/O	I/O Name	Type	I/O Default	Comment
I	R0_CONNECT	ANY(Struct)		Connection to IEC61850_COM block DB
I	ADDRESS	STRING[52]		IEC61850 tag address
I	TIMEOUTS	INT	5000	Timeout in ms
I	COUNTABLE	BOOL	1	Internal value
I	VALUE	DINT	1	Tag value to be written in device
I	RETRANS	BOOL	1	Retransmission of value
O	QERR0	BOOL	1	1 = Connection to IEC61850_COM block 0 faulty
O	QCOMERR0	BOOL	1	Communication IEC61850_COM block 0 not ok
O	QBAD	BOOL	1	0 = Data valid
O	QDONE	BOOL	0	Addressed value as BITSTRING
O	RETVAL	BYTE	0	Return code

Table 26- IEC_RD_IN I/O description

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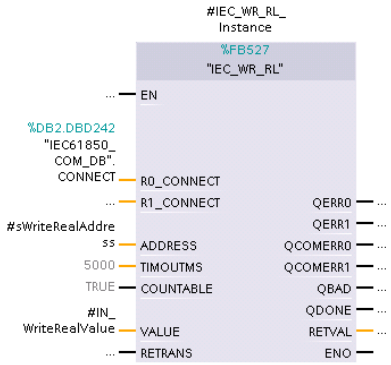
3.13 IEC_WR_RL

3.13.1 Block screenshot



Picture 11 - IEC_WR_RL screenshot

3.13.2 Block description

With the IEC_WR_RL block a Real variable can be written in a IEC61850 Server Device. This block can be used for example to write substitution values.
Input/Output description is equal to IEC_WR_BO Block description. Please see chapter 3.10.2 Block description

3.13.3 Called blocks

Declaration/Block number	Declaration/Block name
UDT5	BST_INT
UDT8	LINK_INFO
FC10	EQ_STRING
FC21	LEN
SFC20	BLKMOV
SFC64	TIME_TCK

Table 27 - IEC_WR_RL called blocks

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3.13.4 I/O description

I/O	I/O Name	Type	I/O Default	Comment
I	R0_CONNECT	ANY(Struct)		Connection to IEC61850_COM block DB
I	ADDRESS	STRING[52]		IEC61850 tag address
I	TIMEOUTS	INT	5000	Timeout in ms
I	COUNTABLE	BOOL	1	Internal value
I	VALUE	REAL	1	Tag value to be written in device
I	RETRANS	BOOL	1	Retransmission of value
O	QERR0	BOOL	1	1 = Connection to IEC61850_COM block 0 faulty
O	QCOMERR0	BOOL	1	Communication IEC61850_COM block 0 not ok
O	QBAD	BOOL	1	0 = Data valid
O	QDONE	BOOL	0	Addressed value as BITSTRING
O	RETVAL	BYTE	0	Return code

Table 28- IEC_RD_IN I/O description

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4. Troubleshooting

No	Problem	Possible Reason	Solution
1.	IEC61850_COM does not get into QSTATE “ZYKLCOM”	MODE: DATASET, some of the tag addresses are not valid	Change mode into LIST, to see which tags keep QBAD = “TRUE”. Check tag addresses with the IEC 61850 browser tool.
		MODE: DATASET, DataSet modifications are not supported with IEC 61850 deivce	Either check if static DataSet can be used. Set DS_CONF_OP to “FALSE” and ensure your tag block sequence is the same like your tag order in the existing DataSet. Another possibility is to use “LIST” mode instead of DATASET mode.
		TIMEOUT or SAMPLE_T are not set properly	Check TIMEOUT value. It's the time the block waits for a successful response to its requests. It should be at minimum 1000ms. Running in LIST mode it should be at minimum 2000ms Check SAMPLE_T. It should represent the current scan time / 100.
		IEC61850 _COM block is placed in more than one cyclic OBs	Ensure, the IEC61850_COM block is placed only in one OB (e.g. OB35)
2.	IEC_RD_XX tag QBAD = 1	Invalid IEC 61850 address string	Check the address of your tag with the IEC61850 browser. Remember that in Step 7 the additional sign “$” has to be replaced with “$$” Further keep in mind, for IEC_ALARM, IEC_REPORT and IEC_CTRL only the address including the IEC61850 object name has to be set. For all others the IEC 61850 attribute has to be added to the address.

No	Problem	Possible Reason	Solution
		IEC61850 Communication is not established	Check the IEC61850_COM block, if running in QSTATE = “ZYKLCOM”. If not, check its parameters.
		IEC61850_COM IED_NAME does not equal IEC61850 device name	Check IED name of IEC 61850 device
3.	IEC61850_COM QBLOCKS and QTAGS output does not fit to tag configuration	No RESET executed	Changes to the tag configuration, like address change, adding tag blocks, removing tag blocks are taken over with executing a RESET. Execute a RESET
4.	PLC Scan time exceeded	Tag blocks are not executed in the optimal OB	To get a better performance of the PLC system, the tag blocks can be put in a lower numbered OB (e.g. OB34, OB33, OB32) with bigger scan times (e.g. 200ms, 500ms, 1s) With this method you can optimize your PLC system
5.	Reporting does not work, no WinCC messages	WinCC settings are not correct	Please check, if your OS is updated and works with your PLC programm. Check if all connections to the PLC are established and working. IEC_REP block should update the timestamp, after the report was generated. (Compare IEC_REP timestamp with tag timestamp get by IEC 61850 browser)
		RP_EN_QB is set to “1”	Something failed enabling Reporting with the Report Control block. Check if your RP_DS_ADDR0/1 match with DataSet address get by IEC 61850 browser.

No	Problem	Possible Reason	Solution
		Reporting was not activated with DIGSI System Configurator (using a SIPROTEC)	Please follow up the procedure described in A.Appendix 1.1 Report configuration with DIGSI if using a SIPROTEC device. If using a different device follow up the manual instructions to add a Report application.
6.	“ZYKLCOM” state is reached, but IEC61850_COM block does not keep this state; communication gets instable.	IEC61850_COM TIMEOUT to small	Increase TIMEOUT value

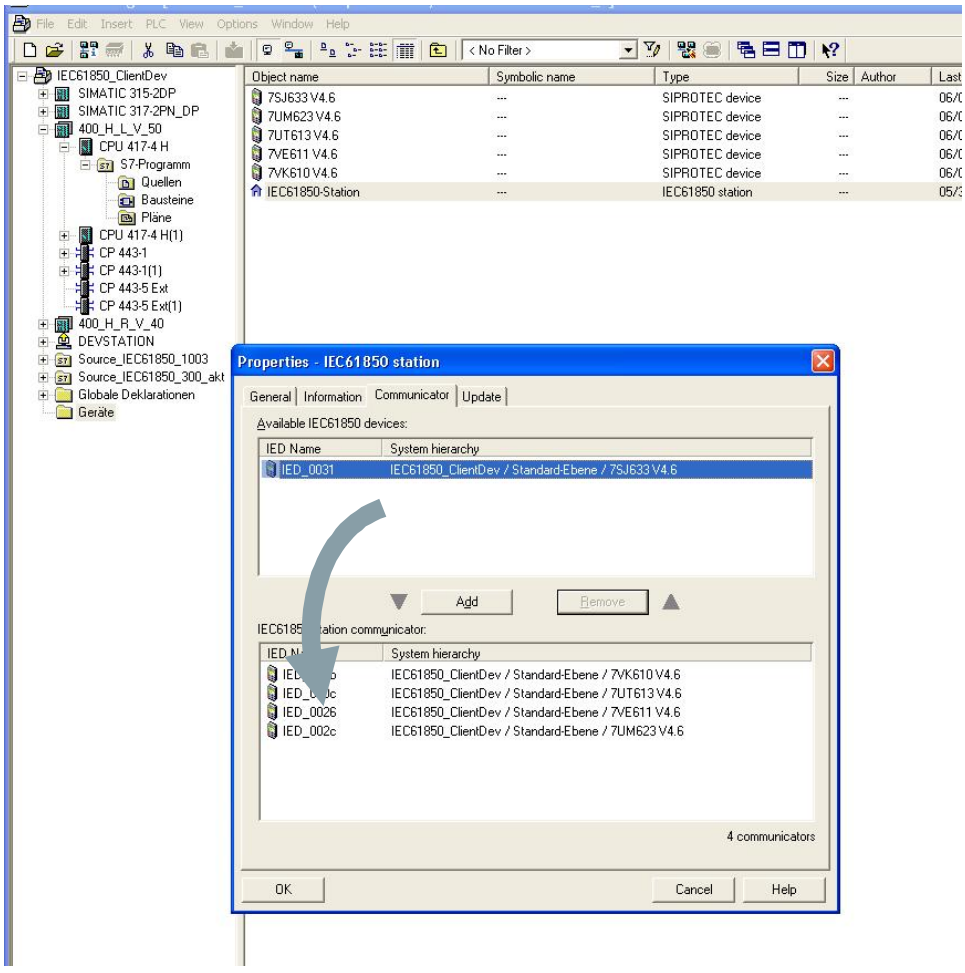
Table 29 - Troubleshooting IEC 61850 communication

A. Appendix

1.1 Report Configuration with DIGSI

A.1.1 Prearrangement

- Make sure, DIGSI is installed and your SIPROTEC device exists in the Devices folder. If not, please install DigSi and then add the SIPROTEC device to your Device Folder. The complete Device MLFB number is necessary for this operation.
- Make sure, an IEC61850 Station exists in your Device Folder. If not: right click in your Device Folder, select “Insert new Object” and then “IEC61850 Station”
- Right click onto the IEC61850 Station. Select “Object Properties” Go to the topic “Communicator”, select your device and execute “Add”. Your device is now part of the IEC61850 station.
  Press “Ok” and leave the Properties dialog.



Picture 12 - Adding a SIPROTEC device to the IEC61850 Station

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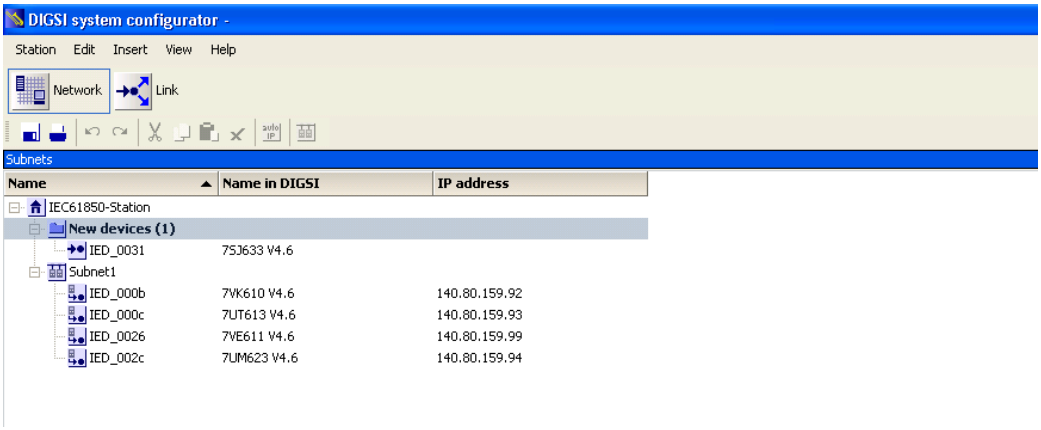
- Double click onto the IEC61850 Station. DIGSI system configurator will open. The new device can be found under “New devices”. You can drag and drop the new device to the dedicated Subnet.



Picture 13 - DIGSI system configurator

A.1.2 Introduction Report Applications

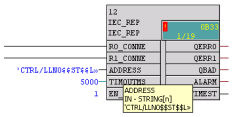
If at least one IEC_REP block is used, a Report Application has to be created in DIGSI. If you have a redundant setup, you have to create two Report Application, one for each IEC61850_COM block instance. For every IEC_REP block, one line with an interconnection has to be added to the Report Application list. If you have two Report Applications you have to add the same tags in the interconnection windows of each Report Application. The address has to correspond to the tag address engineered on the IEC_REP block in the CFC chart. The interconnection order is not relevant.
If you want to use Buffered Reporting, go to the Report Application properties and set “Buffer indications” to “Yes”.

Example:

In the CFC chart an IEC_REP block is configured with the address:

'CTRL/LLN0$$ST$$LEDRs'

The block is connected to a IEC61850_COM block with the IED_NAME: IED_0031



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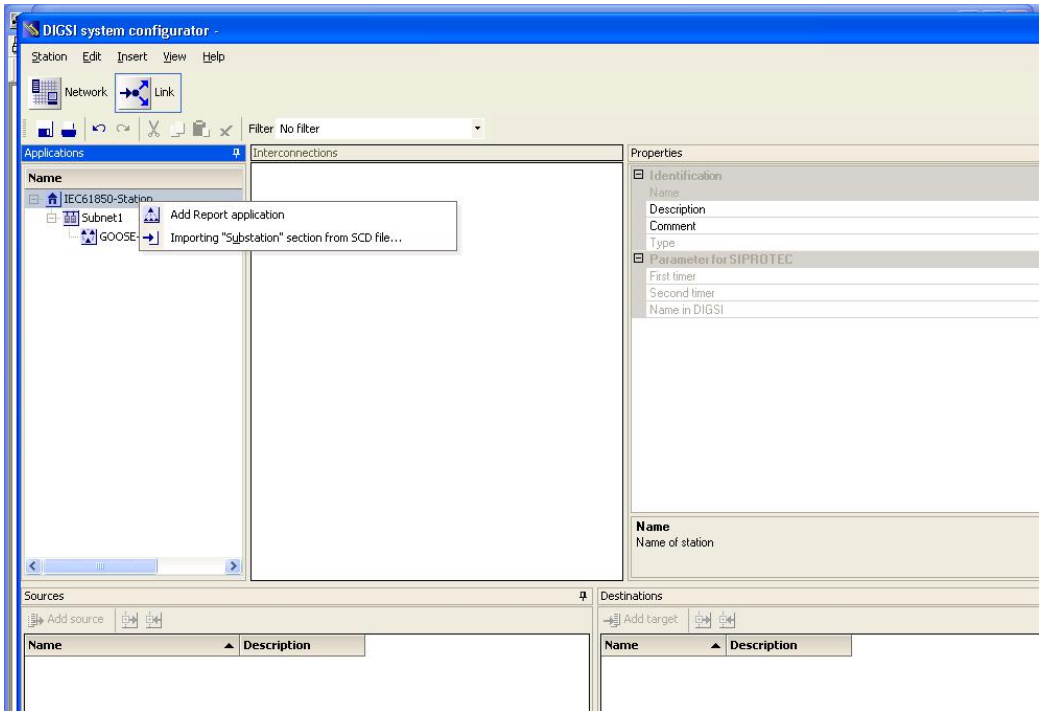
Now a Report Application has to be created. Then an interconnection has to be added with the source:
IED_0031/CTRL/LLN0/LEDRs

If more than one IEC_REP blocks are connected, for every IEC_REP block the interconnection corresponding to the address configured in the CFC has to be added to the Report Application.

A.1.3 Adding Report Applications

- Click on the “Link” symbol. The application view will open
- Right click on the IEC61850-Station and select “Add Report Application”. If you’re using redundancy you have to add two Report Application, one per CPU.



Picture 14 - Adding a Report Application

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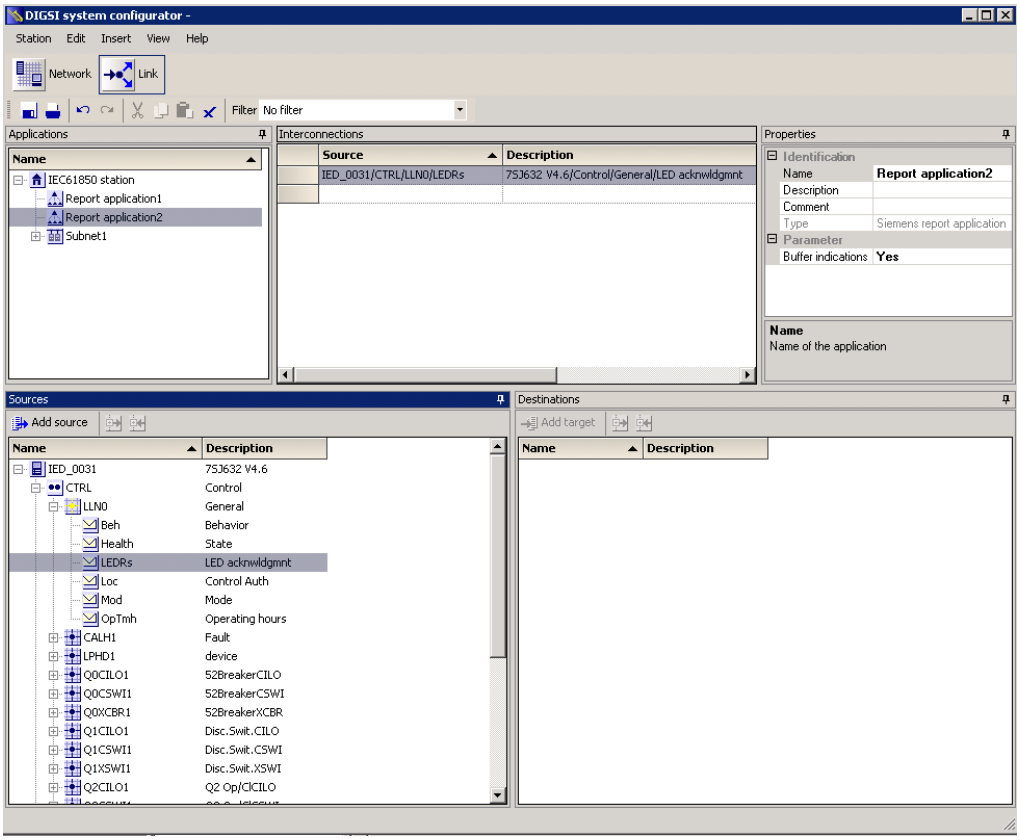
- After adding the Report Application, “Report Aplication X” appears below IEC61850 Station.
  Click onto the Report Application you created.
  On the bottom at the left select the tag you want to add to the Report Application and drag it to the Interconnections window.

  e.g. IED_0031/CTRL/LLN0/LEDRs

  Do this for all IEC61850_REP blocks, you added to the CFC.



Picture 15 - Adding Tags to the Report Application

- Please Save and download the settings to the siprotec.

After downloading to the Siprotec, you can inspect all changes on the device with the IEC61850 Browser tool. The Report Applications are now installed in the device and for each Report Application one DataSet has been added automatically with the tags you have added into the interconnection window of DIGSI.

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If you're using the library in redundant mode, you have to give address of the Report Application, you can find in IEC61850 Browser tool, to the RP_CTRL_AD0 and RP_CTRL_AD1 input parameter of IEC61850_REP block. But because the DataSets for both Report Applications are identical, it is only necessary to give one of the two created DataSets. Please configure one of the both DataSets on the input parameter RP_DSADDR (see 2.2.1).

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